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CONTENTS—APRIL, 1955

St. Thomas and the Analogy of Genus ..... ARMAND MAURER, C. S. B. 127
Existence, the Intellect, and the Will ..... M. J. FARRELLY, O. S. B. 145
Space and Gravitation ..... JAMES A. WEISHEIPL, O. P. 175
FROM THE SECRETARY'S DESK 224
BOOK REVIEWS 232
BOOK BREVITIES 255
BOOKS RECEIVED 257
NOTES ON THE AUTHORS 174

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St. Thomas and the Analogy of Genus

by Armand Maurer, C.S.B.

SO MUCH HAS BEEN written recently about St. Thomas' doctrine of analogy that it may seem superfluous to add another article to the abundant literature on the subject. My reason for doing so is the following. The current literature on St. Thomas' notion of analogy shows a renewed interest in the analogy of genus or inequality. It had been customary to dispose of this kind of analogy in a few short paragraphs or not to mention it at all. Of late, however, its importance has been more widely recognized, and a more serious effort has been made to appreciate its nature. The consensus of opinion, however, is that the analogy of genus is not in the long run a true metaphysical analogy. Rather, it is a pseudo-analogy which fails to measure up to St. Thomas' notion of analogy in the proper sense of the term.[1]

[1] The following support this view either explicitly or by implication: J. Ramirez, "De Analogia secundum doctrinam aristotelicam-thomisticam," in *La Ciencia Tomista* XLVI (1921), 201, note 4. J. LeRohellec, "De Fundamento Metaphysico Analogiae," in *Divus Thomas*, Piacenza XXVIII (1926), 672 ff. M. T.-L. Pendio, *Le rôle de l'analogie en théologie dogmatique* (Paris, 1931), p. 55. J. Maritain, *Les Degrés du Savoir* (Paris, 1932), Annexe II, p. 822. R. Garrigou-Lagrange, *God, His Existence and His Nature* (St. Louis, 1936), II, 210, note 10. G. B. Phelan, *St. Thomas and Analogy* (Milwaukee, 1941), pp. 27-28, 34. J. Anderson, *The Bond of Being, an Essay on Analogy and Existence* (St. Louis, 1949), pp.

If we examine St. Thomas' own writings, however, we find that he nowhere denies that the analogy under discussion is a true type of analogy. Not only does he call it a distinct mode of analogical predication, but he intimates that it is of particular interest to the philosopher of nature and the metaphysician because it has to do with things as they exist.[2] It would seem, then, to have a true metaphysical value in St. Thomas' own eyes. Hence we are led to ask these questions. What did St. Thomas actually teach concerning this type of analogy? Is it a true metaphysical analogy in any sense of the term? Lastly, why is it rejected so generally today as a true analogy? It is with these questions in mind that we wish to make a fresh examination of St. Thomas' texts on the subject.

I

St. Thomas did not write much about the analogy known today as the analogy of genus or inequality. He refers to it only a few times, and his descriptions of it are all too short and concise. Perhaps his clearest account is to be found in his *Commentary on the Sentences.* There he describes it as a mode of analogical predication in which something is predicated analogically *secundum esse et non secundum intentionem,* that is, according to *esse,* and not according to conception. This occurs, St. Thomas explains, when several things equally receive the attribution of some common concept, but in reality the perfection designated by the concept does not possess an *esse* of the same character in all of them: *illud commune non habet esse unius rationis in omnibus.* He illustrates this with an example taken from the physics of his own day. All bodies, he says, equally share in the notion of corporeity or "bodiness." This is

59-60. H. Schwartz, "Analogy in St. Thomas and Cajetan," in THE NEW SCHOLASTICISM, XXVIII (1954), 127-144. The last work calls the analogy of genus "logical analogy."

[2] Cf. *infra,* note 3.

true of both terrestrial and celestial bodies, even though, according to ancient physics, they have a different kind of matter. Terrestrial bodies are composed of the four elements and are subject to generation and corruption. Celestial bodies, on the other hand, are formed of a fifth nature, which is subject only to change of place. Thus, if we consider terrestrial and celestial bodies as they exist, "body" does not have precisely the same meaning when predicated of them. Now the philosopher of nature and the metaphysician consider things in their actual existence. As a consequence, they will not predicate the name "body" or any other name univocally of what is corruptible and what is incorruptible. The logician, on the other hand, considers conceptions or intentions alone; he does not regard things in their actual existence. Hence he predicates "body" univocally of all bodies.[3]

Accordingly, there is a univocal "body" which is predicated equally of everything corporeal, but "bodiness" does not exist equally in all bodies. In the heavenly bodies it exists more perfectly than in earthly bodies. For the philosopher of nature, then, who considers bodies as they actually exist, "body" is predicated analogically, not "according to conception" but "according to *esse*."

The same is true of "substance" predicated of material and immaterial substances. From a logical point of view they all

[3] ". . . aliquid dicitur secundum analogiam . . . secundum esse et non secundum intentionem; et hoc contingit quando plura parificantur in intentione alicujus communis, sed illud commune non habet esse unius rationis in omnibus, sicut omnia corpora parificantur in intentione corporeitatis. Unde Logicus, qui considerat intentiones tantum, dicit hoc nomen corpus de omnibus corporibus univoce praedicari; sed esse hujus naturae non est ejusdem rationis in corporibus corruptibilibus et incorruptibilibus. Unde quantum ad metaphysicum et naturalem, qui considerant res secundum suum esse, nec hoc nomen corpus, nec aliquid aliud dicitur univoce de corruptibilibus et incorruptibilibus." *In I Sent.*, d. 19, q. 5, a. 2, ad 1. For St. Thomas' conception of the physical world, cf. J. de Tonquédec, *Questions de cosmologie et de physique chez Aristote et saint Thomas* (Paris, 1950), pp. 7-71.

belong to the one univocal genus; the genus "substance" is predicated of all univocally with respect to the *ratio* or definition of substance. But in reality immaterial substances have greater perfection as substances than those that are material. Hence even though the logician places all created substances in the genus "substance," the metaphysician or philosopher of nature will not do so, because they consider things as they actually exist. All created substances are in the same *logical* genus, but they are not all in the same *natural* genus, for the latter takes into account things as they actually exist, not as logically considered.[4]

So too it can be said that all angels are in the same genus of substance, for substance is predicated of all equally and univocally, at least with respect to the meaning of the term: *quantum ad intentionem*. But it is not predicated equally of them with respect to existence (*quantum ad esse*), for in reality one is prior to another in perfection. They resemble numbers, one of which is in reality prior to another although they are all in the same genus of number.[5]

St. Thomas uses the same principles in answering the question: Are all sins equal? He maintains, of course, that they are not; some are worse than others. But one objector, who knows his logic better than his ethics, says that all sins are equal. Is not a genus equally participated by its species? Now "sin" is the genus of all sins. It follows, then, that all sins are equal and all sinners sin equally.[6]

[4] "Dicendum quod substantiae immateriales creatae in genere quidem naturali non conveniunt cum substantiis materialibus, quia non est in eis eadem ratio potentiae et materiae; conveniunt tamen cum eis in genere logico, quia etiam substantiae immateriales sunt in praedicamento substantiae, cum earum quidditas non sit earum esse." *Summa Theol.*, I, 88, 2, ad 4. Cf. *ibid.*, I, 66, 2, ad 2.

[5] Cf. *In II Sent.*, d. 3, q. 1, a. 5, obj. 3 and reply.

[6] "Genus aequaliter participatur a suis speciebus. Sed peccatum est genus omnium peccatorum. Ergo omnia peccata sunt aequalia, et aequaliter peccat quicumque peccat." *De malo* II, 9, obj. 16.

St. Thomas replies:

> All animals are equally animals, but they are not equal animals, for one animal is greater and more perfect than another. Similarly, it is not necessary on this account that all sins be equal.[7]

In this reply the Angelic Doctor distinguishes between the order of logic and that of reality. He is telling us, in effect, that the genus "animal" may be predicated equally and univocally of all animals, and so too the genus "sin" of all sins. But as animals exist, some are more perfect than others, and in reality some sins are worse than others.

It is important, therefore, to keep the order of logic distinct from that of reality. This is why St. Thomas distinguishes between two ways of considering a genus. A genus, he tells us, can be considered either logically or naturally (*physice*). Considered logically, it abstracts from all existential conditions, such as the manner in which the subjects exist in reality, their kinds of matter and potentiality. He calls this sort of abstract notion a logical genus (*genus logicum*). However, this is not the only way of considering a genus. It can be considered in such a way that it will take into account the diverse types of matter and potencies and the modes of existing of the things in that genus. The genus so considered is then called a natural genus (*genus naturale*).[8]

By this distinction St. Thomas does not mean that there are two kinds of genera really distinct from each other, one logical and the other natural. He is simply describing two ways in which a genus can be considered by the intellect. Moreover, by a natural genus he does not mean a nature or essence which is

[7] "Dicendum quod omnia animalia sunt aequaliter animalia, non tamen sunt aequalia animalia, sed unum animal est altero majus et perfectius; et similiter non oportet quod omnia peccata propter hoc sint paria." *Ibid.*, ad 16.

[8] Cf. *supra*, note 4; also *In X Metaphy.*, 12, ed. Cathala, n. 2142; *De pot.*, 7, 7, ad 1 *in contrarium; In Boeth. de Trin.*, VI, 3, ed. P. Wyser, p. 69, lines 1-10.

participated in by a multitude of species, as a species is one nature or essence participated in by many individuals. There is no one nature signified by a genus. An examination of St. Thomas' doctrine on genus will clarify this point, which is essential to an understanding of the analogy of genus.

St. Thomas tells us that a genus is that which is placed first in a definition, being predicated essentially of a subject and having differences which are its qualities. For instance, "animal" is placed first in the definition of man, and it has "biped" or "rational" as its substantial quality.[9] Both the genus and the species signify the whole essence of a thing, although they do so in different ways. The species signifies the whole essence determinately, since it is a name taken from the specific or ultimate form of a thing. The genus, on the other hand, signifies the whole essence indeterminately, being taken from the matter of a thing. St. Thomas illustrates how the genus is taken from matter by the example of the genus "body." "Body" means that which has a perfection such that three dimensions can be indicated in it, and this perfection is related as matter with respect to further perfections. Similarly, something is called "animal" from the fact that it has a sensitive nature, and "rational" from the fact that it has a rational nature, which is related to sensitive nature as form to matter.[10]

Since the species is more particularly related to form and the genus to matter, the unity of the two will not be the same. The unity of the species is that of a nature or essence, for the species is taken from the ultimate form, which is simply one in reality: *species sit una natura. Et hujus ratio est quia species sumitur a forma ultima, quae simpliciter una est in rerum*

[9] "Genus dicitur quod primo ponitur in definitione et praedicatur in eo quod quid, et differentiae sunt ejus qualitates. Sicut in definitione hominis primo ponitur animal, et bipes sive rationale, quod est quaedam substantialis qualitas hominis." *In V Metaph.*, 28, *ed. cit.*, n. 1122.

[10] Cf. *De Ente et Essentia*, ch. 2, ed. Roland-Gosselin (Paris, 1948), pp. 14-19. Also *In V Metaph.*, 28, *ed. cit.*, n. 1123.

natura.[11] So the unity of a species is a unity purely and simply (*simpliciter*). The unity of a genus, on the other hand, is not that of an essence or nature. St. Thomas writes:

> Although genus signifies the whole essence of the species, it is not necessary that different species in the same genus have one essence. For the unity of the genus comes from its very indetermination or indifference; not in such a way, it is true, that the genus expresses a nature numerically identical in different species, to which might be joined another thing—the difference—determining it as form determines matter which is numerically one. On the contrary, the genus expresses some form—although not in a determinate way this one or that one—which the difference signifies determinately, and which is not other than that which the genus signified indeterminately.[12]

It appears then that the unity of the genus comes from its indetermination, and since this indetermination in turn is a result of the intellect abstracting from specific differences, the unity of the genus is a logical and not a natural unity.[13] Following Aristotle, St. Thomas says that a genus is not *one essence.* Unlike a species, a genus is not one purely and simply, but it is one in a certain way: *genus quodammodo est unum et non simpliciter.* That is to say, a genus is one only in thought or definition.[14]

[11] *In VII Phys.*, 8, n. 8.

[12] *De Ente et Essentia*, ch. 2, *ed. cit.*, pp. 19-20.

[13] "Genus autem non sumitur a forma aliqua quae sit una in rerum natura, sed secundum rationem tantum . . . in sola consideratione accipitur forma generis, per abstractionem intellectus a differentiis. Sic igitur species est unum quid a forma una in rerum natura existente: genus autem non est unum; quia secundum diversas formas in rerum natura existentes, diversae species generis praedicationem suscipiunt. Et sic genus est unum logice, sed non physice." *In VII Phys.*, 8, n. 8.

[14] Cf. *ibid.* St. Thomas is here commenting on Aristotle's statement: *genus non est unum quid* (Τὸ γένος οὐχ ἕν τι), *Physics* VII, 4, 249a22. Aristotle is making the point here that the genus "movement" is not a unity; hence its various kinds are not comparable. He goes on to say that "many similar cases escape notice" (παρὰ τοῦτο λανθάνει πολλά). I am here following the translation of W. D. Ross, Aristotle's *Physics* (Oxford, 1936), p. 427. He paraphrases Aristotle's statement thus: "but there are

If this is true, it is incorrect to speak of a generic essence in the sense in which we can speak of a specific essence. Unlike a species, a genus has a unity only in thought; it does not signify *one* nature. It signifies a multitude of natures, but it does so indistinctly, in abstraction from the specific differences which are signified determinately by the species.

What, then, does St. Thomas mean by a natural genus? It is simply the generic *ratio* considered in connection with the existential factors from which the logician precisely abstracts when he considers the same generic *ratio*. Consider, for example, the genus "substance." There is a sense in which it is a natural genus and another in which it is only a logical genus. Those things are in the natural genus of substance which have the same kind of matter and potentiality, that is to say, all corruptible bodies, which are composed of the four elements and which are in potentiality to generation and corruption. The incorruptible bodies of the heavens do not have the same sort of matter as the corruptible bodies of this earth, and they are in potency only to change of place. Angels, on the other hand, have no matter whatsoever in their composition, and they are in potency neither to generation and corruption nor to change of place. If we predicate "substance" of all these things, it will be only as a logical genus. If we predicate "body" of corruptible and incorruptible bodies, we will do so univocally, according to a logical conception: *secundum intentionem logicam*.[15]

many other undetected cases in which there is a lack of a single genus." (p. 681). The older Oxford translation is: "the genus is not a unity but contains a plurality latent in it." In either case it does not seem correct to say, as Fr. Zammit does, that Aristotle expressly speaks here of the analogy of genus. (Cf. his edition of Cajetan's *De Nominum Analogia* [Rome, 1934], p. 5, note 1). Aristotle seems to have had no notion of the analogy of genus, as he had no notion of *esse* as the act of being, on which that analogy depends.

[15] "Corporeitas secundum intentionem logicam univoce in omnibus corporibus invenitur; sed secundum esse considerata, non potest esse unius rationis in re corruptibili et incorruptibili; quia non similiter se habent in potentia essendi, cum unum sit possibile ad esse et ad non esse, et alterum

It is the logician, then, who forms a univocal conception or "intention" of a genus. Not so the philosopher of nature, who considers the genus naturally or physically. He takes into account the kinds of matter and potentiality and the modes of existence of the things he studies, and their diversity prevents the formation of a univocal conception. The conception he forms is not abstract and logical but concrete. St. Thomas contrasts, for example, the concrete *ratio* (*concretam rationem*) considered by the philosopher of nature and the abstract notion of the logician and mathematician. Thus when the latter consider quantity and unity, they do so in an abstract manner, and their predication of these notions is not equivocal but univocal. However, when they are considered concretely by the philosopher of nature, who deals with them as they are involved in matter, they are in a way predicated equivocally: *aequivoce quodammodo dicuntur.*[16]

How are we to understand this last statement? St. Thomas does not say that the concrete *ratio* of the philosopher of nature is predicated purely and simply equivocally, but *quodammodo* equivocally. He sometimes uses expressions such as this to indicate analogical predication. For example, in the treatment of the divine names in the *Summa contra Gentiles, non pure aequivoce, non omnino aequivoce* mean *analogice.*[17] And in the

non; et per modum istum dicit Philosophus in X *Metaph.*, [ch. 10, 1058b28-32] quod de corruptibili et incorruptibili nihil commune dicitur, nisi communitate nominis." *In II Sent.*, d. 12, q. 1, a. 1, ad 1. Cf. *In Boeth de Trin.*, VI, 3, *ed. cit.*, p. 69, lines 1-10; *In X Metaph.*, 1, *ed. cit.*, n. 2142; *Summa Theol.*, I, 66, 2, ad 2; I, 88, 2, ad 4.

[16] "Est autem considerandum quod multa quidem secundum abstractam considerationem vel logici vel mathematici non sunt aequivoca, quae tamen secundum concretam rationem naturalis ad materiam applicantis, aequivoce quodammodo dicuntur, quia non secundum eandam rationem in qualibet materia recipiuntur; sicut quantitatem et unitatem, quae est principium numeri, non secundum eandem rationem contingit invenire in corporibus caelestibus et in igne et in aere et aqua." *In VII Phys.*, 7, n. 9.

[17] *Sum. cont. Gent.* I, 33-34. So also in his *In Boeth. de Trin.*, VI, 3 and 4, *fere aequivoce, quasi aequivoce* seem to mean *analogice.* Cf. *ed. cit.*, p. 67,

Commentary on the Sentences St. Thomas actually calls the predication of a genus by the philosopher of nature and the metaphysician analogical.[18] It seems justified, then, to interpret the expression *aequivoce quodammodo* as indicating analogical predication.

If this is true, it seems that it is the mind of St. Thomas that a genus is predicated analogically when it is considered naturally and concretely, or in other words, as involved in the diverse kinds of matter, potentialities and modes of *esse* of the subjects in which it is realized. It is predicated univocally only when it is considered logically or mathematically, in abstraction from matter and *esse*. This is the teaching of St. Thomas in the text from the *Commentary on the Sentences* with which we began, but perhaps its significance is now clearer.

It should be noted that the analogical mode of predication we are considering here is proper to the predication of a genus and not of a species. The reason for this is that individuals participate in the *ratio* of a species equally: *individua unius speciei aequaliter speciei rationem participant.*[19] John, Peter, and Paul equally participate in the nature of humanity, so that "man" is predicated of them univocally, not only according to conception but also according to *esse,* for individuals in one species do not differ formally, but only materially, from each other. They have a nature in common, and they differ with respect to their individuating principles and their diverse accidents. They do not differ in their essential perfections. Accordingly, although there is an essential or *per se* order among the species of one genus, there is only an accidental or *per accidens* order among the individuals of one species. One is not

line 20, p. 75, line 7; trans. A. Maurer, *The Division and Methods of the Sciences* (Toronto, 1953), p. 69, n. 16; p. 77, n. 17.

[18] Cf. *supra*, note 3.

[19] *In de Causis*, 4 (*Opera Omnia*, [New York, 1949]), XXI, 725b. On this point, cf. C. Fabro, *La Nozione Metafisica di Partecipazione secondo S. Tommaso d'Aquino*. 2nd ed. (Turin, 1950), pp. 164-165.

essentially, but only accidentally, more perfect than another and prior to it. For example, one man is more intelligent or virtuous than another.[20]

As a consequence, the species is predicated equally and univocally of the individuals contained in it, not only in regard to the conception, but also in regard to the *esse* of the specific perfection in the individuals.[21]

It would seem, then, that the type of analogical predication we are concerned with here is truly an analogy of genus. For it has to do with the predication of a genus of different species and not with the predication of a species of a number of individuals. Because even in existence the specific nature is not found *per prius* and *per posterius* in the individuals which participate in it, it is not predicated analogically of them, but solely univocally, both in regard to the conception and in regard to *esse*. In the case of a generic *ratio,* however, which is participated unequally by the species, it is predicated of them analogically, at least with respect to *esse*. And since it is the philosopher of nature and the metaphysician who consider things as they exist, the analogical predication of genera will be their business and not that of the logician and the mathematician who are not concerned with existence but simply with concepts.

The objection may be raised that generic predication is always univocal because the *ratio* is realized in each of the things of which it is predicated in a formally identical manner. Material conditions may render it more perfectly possessed by one and less perfectly by another, but the *ratio* remains identical. That is why St. Thomas says that this is not an analogy according to conception (*secundum intentionem*). Now for predication to

[20] *De Spiritualibus Creaturis*, 8; *In de Causis, ibid., In III Metaph.*, 8, n. 438. Cf. C. Fabro, *op. cit.*, pp. 171-173.

[21] "Genus praedicatur aequaliter de speciebus quantum ad intentionem, sed non semper quantum ad esse, sicut in figura et numero, ut in III *Metaph.*, dicitur [ch. 3, 999a12]. Sed hoc in speciebus non contingit, ut ibidem dicitur." *In II Sent.*, d. 3, q. 1, a. 5, ad 3.

be analogical, the *ratio* predicated must be partly the same and partly diverse.[22] If it is entirely the same, the predication is univocal. So it would seem that there is no analogy in the true sense when a genus is predicated of its subordinate species.

The texts of St. Thomas which have been presented in this article reveal the matter in quite a different light. When he says that this type of analogy is not one according to conception, he seems to mean, as he puts it in a parallel text, not according to *logical* conception or intention (*secundum intentionem logicam*).[23] A genus is predicated univocally according to the abstract consideration of the logician or mathematician; not so, however, according to the concrete or "natural" consideration of the philosopher of nature or the metaphysician.

It is of paramount importance in discussing this question to recognize the distinction St. Thomas makes between a logical and a natural genus. The natural genus, considered according to its concrete *ratio,* is not the logical genus of the logician or the mathematician. What is the essential difference between them? The natural genus includes the different kinds of matter and potentiality and the diverse modes of *esse* with which it is realized in the real world, whereas the logical genus abstracts from them. That is why the latter is univocal and the former analogical.

Since the concrete *ratio* which expresses the natural genus includes a reference to diversity of modes of existing, it does not have the absolute unity required for a univocal concept. In our key text on this question, St. Thomas says that the

[22] "Sciendum quod aliquid praedicatur de diversis multipliciter: quandoque quidem secundum rationem omnino eandem, et tunc dicitur de eis univoce praedicari, sicut animal de equo et bove. . . . Quandoque vero secundum rationes quae partim sunt diversae et partim non diversae: diversae quidem secundum quod diversas habitudines important, unae autem secundum quod ad unum aliquid et idem istae diversae habitudines referuntur; et illud dicitur analogice praedicari." *In IV Metaph.*, 1, *ed. cit.*, n. 535.

[23] Cf. *supra*, note 15.

generic perfection does not have an *esse* of the same character (*ratio*) or mode in the various things to which it is common.[24] It appears from this that the diversity of the mode of *esse* introduces into the concrete conception of the natural genus a diversity which excludes univocity. It does not seem true to say, therefore, that there is no diversity in the generic *ratio,* at least if we refer to the genus considered naturally. Because there is diversity in the mode of *esse* with which the generic perfection is realized in things, along with sameness in the generic perfection understood formally as such, the concrete conception which includes both, contains at the same time diversity and sameness, or, in other words, it is analogical.

A further objection can be raised. According to St. Thomas, the unequal participation in one nature does not exclude univocity: *magis et minus numquam univocationem vel speciei unitatem auferunt.*[25] There may be an unequal participation of many things in one nature, but that does not prevent univocity. So the greater or less intensity of a generic note does not introduce analogy into it. It remains univocal.

However, if we examine the context of the above statement of St. Thomas, as well as parallel texts, it appears that he is not here referring to the sort of inequality involved in the analogy of genus. The statement means simply that if several things participate unequally in one form, the unity of the species and univocity of predication are not destroyed. For example, what is more white is said to be clearer than what is less white, but this inequality in clarity and whiteness does not prevent univocity and the unity of the species "whiteness." This sort of inequality, however, has nothing to do with the inequality involved in the analogy of genus for a genus is not one form or nature. St. Thomas clearly distinguishes between the above-

[24] Cf. *supra,* note 3. St. Thomas uses "mode" instead of "ratio" *In Boeth. de Trin.,* VI, 3, *ed. cit.,* p. 69, line 10.

[25] *In I Sent.,* d. 35, q. 1, a. 4, ad 3. Cf. *Summa Theol.,* 1, 50, 4, ad 2.

mentioned inequality and that found in the hierarchy of diverse forms. There is inequality, he goes on to say, between the clarity of something white and the clarity of something red or green. There is also inequality in the intellectuality of angels and men. This inequality does destroy the unity of the species and, by implication, univocity. It would seem to be this second kind of inequality, not the first, that is found in the unequal participation of a generic *ratio* by different species. These texts on inequality, therefore, do not prove that generic predication is in every sense univocal.[26]

II

Historically, the notion that the analogy of genus is not a true analogy can be traced back to Cajetan, who says that it is entirely foreign to analogy: *alienus ab analogia omnino sit.*[27]

[26] "Dicendum quod magis et minus dupliciter accipitur. Uno modo secundum diversum modum participationis unius et ejusdem formae, sicut magis album dicitur magis clarum quam minus album; et sic magis et minus non diversificant speciem. Alio modo dicitur magis et minus secundum gradum diversarum formarum, sicut album dicitur magis clarum quam rubeum aut viride; et sic magis et minus diversificant speciem; et hoc modo angeli differunt in donis naturalibus secundum magis et minus." *De Spiritualibus Creaturis* 8, ad 8.

"Dicendum quod magis et minus nunquam univocationem vel speciei unitatem auferunt; sed ea ex quibus magis et minus causantur possunt differentiam speciei facere, et univocationem auferre: et hoc contingit quando magis et minus causantur non ex diversa participatione unius naturae, sed ex gradu diversarum naturarum; sicut angelus homine intellectualior dicitur." *In I Sent.*, d. 35, q. 1, a. 4, ad 3. Cf. *Summa Theol.*, I, 50, 4, ad 2; *De pot.*, 7, 7, ad 3.

[27] Cajetan, *De Nominum Analogia*, ed. P. N. Zammit (Rome, 1934), n. 3, p. 6; trans. E. Bushinski, H. Koren, *The Analogy of Names* (Pittsburgh, 1953), p. 11.

Fr. Zammit remarks that it is clear from the texts of St. Thomas cited in his edition that in one way this analogy is a true analogy and in another way it is not. He goes on to say that this is Cajetan's view as well, and that Cajetan did not mean to reject it entirely as a true analogy. Cf. *ed. cit.*, p. 9, note 1. This is difficult to reconcile with Cajetan's statement: *alienus ab analogia omnino sit.* The English translators of the *De Nominum Analogia* point out that Cajetan does not reject it absolutely,

When we read Cajetan's own exposition of the analogy of genus, or, as he preferred to call it, the analogy of inequality, we are struck by a curious fact. Nowhere in his description does he bring out the role of *esse* in this analogy. It is true that he calls it an analogy *secundum esse* when quoting St. Thomas.[28] But in the paragraphs of the *De Nominum Analogia* in which he gives his own account of it, he does not mention *esse* at all. He tells us that those things are analogous according to inequality which have a name in common, and the *ratio* indicated by the name is entirely the same but unequally participated. For example, " body " is a common name given to celestial and terrestrial bodies, and the *ratio* of all bodies, insofar as they are bodies, is the same: " body " means a substance subject to three dimensions. But the *ratio* of " bodiness " is not in celestial and terrestrial bodies with equal perfection. The logician, he concludes, calls such analogous things " univocal," but the philosopher calls them " equivocal," because the former considers the intentions of names while the latter considers natures.[29]

If this description is compared with that of St. Thomas, it will be noticed that Cajetan has omitted reference to *esse* wherever it appears in St. Thomas. Where St. Thomas describes this analogy as one *secundum esse,* Cajetan says that it consists in the unequal participation in the *ratio* of a genus. Where St. Thomas says that it concerns the natural philosopher and

since he calls it an analogy " in a less proper sense." But they imply that he rejects it as a *true metaphysical* analogy. Cf. p. 13, note 19.

Following Cajetan, John of St. Thomas rejected the analogy of inequality as analogy in the proper sense. Cf. John of St. Thomas, *Curs. Phil., Ars Log.*, II, P. Q. XIII, a. 3, ed. B. Reiser (Turin, 1930), I, 482-484. Suarez denied its metaphysical character. Cf. *Disputationes Metaphysicae,* Disp. 28, 3, n. 20 (Paris, 1877), XXVII, 20; Disp. 32, 2, n. 15, p. 323.

[28] *Op. cit.*, n. 6, p. 8; trans. pp. 12-13. Cajetan also uses this expression in his Commentary on the *De Ente et Essentia,* 2, q. 3, ed. M. H. Laurent (Turin, 1934), n. 18, p. 32.

[29] *Op. cit.*, nn. 4-5, p. 6; trans. pp. 11-12.

the metaphysician because they have to do with things as they exist (*secundum suum esse*), Cajetan says that the philosopher calls it equivocity because he is concerned with *natures*. Indeed, Cajetan's account of this type of analogy is in the language of essentialism and not in the existential terminology of St. Thomas. It may be that this is only a matter of terminology and not of doctrine. Certainly it appears that Cajetan thought his description simply another way of saying the same thing as St. Thomas. It can be questioned, however, whether the language of Cajetan is adequate to convey St. Thomas' meaning, and even whether his did not in fact misrepresent that meaning when he expressed it in his own essentialist terms. It is difficult, in any case, not to feel uneasy when reading Cajetan on this point. The impression is given that he has missed the significance of the meaning of *esse* in St. Thomas' text, an impression which is confirmed by examining other instances in which Cajetan interprets Aquinas' doctrines involving *esse*.[30]

Cajetan did not investigate the unity, abstraction, and predication proper to the analogy of genus because he considered it really a case of univocity and consequently subject to its laws.[31] But if it is in its own way a true analogy, a further inquiry is needed to determine how the concrete conception in such an analogy is formed and what sort of unity it has. It would carry us beyond the limits of the present paper to enter fully into these difficult problems. One remark, however, might be suggested by way of conclusion. Since a genus, considered naturally, is conceived in reference to the diverse modes of existence in which it is realized, it appears that it is properly conceived in a judgment and not in an act of simple apprehension. The reason for this is, according to St. Thomas, that we properly

[30] Cf. E. Gilson, "Cajétan et l'existence," in *Tijdschrift voor Philosophie* XV (1953) 267-286.

[31] *Op cit.*, n. 7, p. 9; trans. p. 14.

grasp existence in judgment.[32] It would seem, then, that any analogy which is *secundum esse* must be grasped in judgment and not in an act of apprehension, which is properly directed to the understanding of essences.

It is not generally realized that St. Thomas' doctrine of analogy is above all a doctrine of the *judgment* of analogy, and not of the analogy of *concept*—at least if we mean by " concept " the expression of an act of simple apprehension.[33] The analogy of proportionality, for example, is a judgment of the likeness of several proportions. St. Thomas expresses an analogy of this sort when he makes the judgment: " Whatever good we attribute to creatures pre-exists in God, and in a higher way." [34] Or more generally: *Sicut (Deus) se habet ad ea quae ei competunt, ita creatura ad sua propria.*[35] It is through judgments of analogy of this sort that we form an analogical conception of such perfections as being and goodness, which are applicable both to God and creatures: that is to say, conceptions which are at the same time diverse and proportionately the same in meaning.

A generic concept is not like the conception of being, truth, or goodness, for these latter cannot be conceived in a purely univocal way. Since they are conceptions either of being or of its transcendental modes, they cannot be abstracted from *esse,* and hence they are intrinsically analogical both *secundum intentionem* and *secundum esse.*[36] On the other hand, genera can be abstracted from existence and its modes by the logician and the mathematician, both of whom are not concerned with existence but only with concepts. These generic concepts, abstracted from all existential conditions through simple appre-

[32] Cf. *In Boeth. de Trin.*, V, 3, *ed. cit.*, p. 38, lines 8-11. Cf. also, E. Gilson, *Being and Some Philosophers* 2nd ed. (Toronto, 1952), p. 203.

[33] See the penetrating comparison between St. Thomas' notion of analogy and that of Duns Scotus in E. Gilson, *Jean Duns Scot* (Paris, 1952), p. 101.

[34] *Summa Theol.*, I, 13, 2.

[35] *De Ver.*, XXIII, 7, ad 9.

[36] Cf. *In I Sent.*, d. 19, q. 5, a 2, ad 1.

hension, are purely univocal. But they can become analogical when they enter into the context of judgment in metaphysics or the philosophy of nature, for they are then conceived in relation to diverse modes of existence, and such diversity is the reason for analogy.

How precisely is the analogical conception of a genus formed in a judgment? It would seem that in its own way it too is conceived through a judgment of proportionality. For there is a likeness of proportions between a genus, existentially considered, and one of its species on the one hand, and the same genus, existentially considered, and another species on the other hand. For example, there is a proportionality between *esse animale* and *canis* on the one hand, and *esse animale* and *homo* on the other hand.[37] For animal, existentially considered, is related to the species "dog" proportionately, as animal, existentially considered, is related to the species "man." In other words, dog and man are both animals, but unequally, each proportionate to its nature. This is the reason, incidentally, why any univocal comparison between the behavior of man and other animals is misleading. Although there is a univocal concept of animal, predicable of the various species, in existence animality and its activities are only proportionately or analogically similar in those species.

If analogy is considered simply in terms of essences and concepts abstracted through simple apprehension, the analogy of genus is bound to appear as another case of univocity. It is only when, like St. Thomas himself, we view analogy primarily from the point of view of judgment, based upon *esse* and its modes, that we can understand how the analogy of genus is, in a sense, a true analogy for the philosopher of nature, for the metaphysician, and, we may add, for the theologian.

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[37] I am indebted to Fr. G. Phelan for this formulation of the analogy.

Existence, the Intellect, and the Will

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THE CENTRAL PROBLEM of this paper can be expressed in the question, " How is the goodness of being present to the will? " The will does not love unless the object of its love is somehow presented to it and presented to it not in just any way, for if it were before the will only as true, as one, as being, or as beautiful, it would not solicit the will's act. Only if it is present in its *ratio bonitatis* will the will be placed in first proximate act since it is this *ratio bonitatis* that is the proper motive of the will's operation. As the eye cannot see unless its proper object, color, is present to it, so the will cannot love unless its proper object, goodness, is present to it. Does the intellect, by judging that this being or this act is desirable here and now, present the object in its goodness to the will? Is this the way in which the goodness of being attracts the will?

This problem concerning the presence of its proper object to the will presupposes another which must be answered first. Before we solve the problem, " How does the intellect know what a thing is? " we must first understand what principle of being makes a being to be what it is. Only after this metaphysical problem has been solved can we examine the psychological process by which the " whatness " of being is present to the intellect. Analogically, we must know by what principle or principles being is good before we can examine the psychological process by which the good solicits an act of willing. Hence our first problem in this paper is this metaphysical problem concerning the nature of the goodness of being. Then we will try to discover how being is present to the will precisely in its perfection of goodness.

I. The Nature of the Goodness of Being

Every created being is composed ultimately of two metaphysical principles on the substantial level, principles which are distinct and different yet incomplete and inseparable. These principles are of course essence, or that which makes a being to be what it is, and existence, or that which makes a being simply to be. Both of these principles are acts, though the essential act is potential with respect to the existential act. Moreover, being has certain immediate properties which vary in perfection with the perfection of these metaphysical principles. These properties, or the transcendentals, are predicated of actual being rather than of merely possible being.[1] Goodness, we know, is one of these properties; it is being in its desirability or as perfective of an appetite. To know then the nature of goodness we must know its relation to the metaphysical structure of being. Why is being desirable; what is the fundamental cause or the source of the goodness of being? Being is good intrinsically and not merely good by an extrinsic denomination, or in relation to a will, or because it is loved. Now if we consider being metaphysically and on the substantial level, we can explain the fundamental cause of the goodness of being in only three ways. We can either say that being is good properly by its essence, or properly by its existence, or properly by both principles, i. e., that both principles are intrinsically good.

The true answer, I submit, is that created being is good properly by existence alone and not by its essence. The essential principle is not intrinsically good (as it is not intrinsically existence) but participates in goodness through existence. This can be substantiated by many quotations from St. Thomas, but in the present paper it is impossible to go thoroughly into the

[1] Cf. *De ver.*, XXI, 4, ad 4 where St. Thomas shows that goodness, unity etc. are inseparably united to being so that one can say "bonitas est bona." One cannot say "albedo est alba" because such perfections are not always actual.

speculative proof for it. However, this is not a serious difficulty since the texts of St. Thomas will clearly show the necessity of offering a solution for our central problem, " How is the goodness of being—i. e., being in its existential act—presented to the will? How is existence present to the will? " We shall, then, briefly offer two interpretations of St. Thomas' doctrine on the nature of the good and then seek enlightenment in the texts of St. Thomas.

John of St. Thomas holds that the formal *ratio* of transcendental goodness does not consist properly in the relation of a thing to an appetite (though it does connote this relationship) but in that entitative and intrinsic perfection of a thing which is the foundation of this relation. He further specifies his answer by saying that goodness cannot consist in existence itself but it must consist properly in the essential and formal perfection of being, not in so far as this makes a being perfect (for this function is proper to it as formal cause) but in so far as it attracts and draws being or as it is perfective of being (for this function is proper to it as final cause). It cannot consist in existence itself because:

> goodness can be desired as not yet existing but as able to exist . . . existence should be distinguished from goodness itself as it is distinct from essence, because by making the essence exist it makes goodness exist . . . goodness is not compared to being as the formal *ratio* itself by which it is made existing but as something that can exist and not exist, have *esse* and *non-esse*.[2]

Geiger, a modern Thomist who treats this subject, holds that being is good both by its essence and by its existence though primarily by its existence. In the texts where St. Thomas seems to say that being is good properly by its existence he is not using *esse* merely to mean existence but is contrasting the

[2] John of St. Thomas. *In I Summa Theol.*, qq. V et VI, d. 6, a. 1, 9 bis. In the beginning of this disputation the views of many scholastic philosophers are presented.

singular with the universal and saying that being is good only in the state of singularity, or in the concrete state of being.[3] The essence must be intrinsically good because transcendental goodness extends to all being and the essence also is being.

Both of these interpreters of the thought of St. Thomas, then, hold that the creature is good by its essence or that the essence of the creature is intrinsically good. Is this the doctrine of St. Thomas?

It is true that St. Thomas does explicitly say at times that the essence itself of the creature is good but usually there is some qualification in the context that puts this in the proper light. For instance he says in the article quoted by John of St. Thomas:

> It is necessary therefore that the true and the good add to the understanding of being the note of perfecting another (respectum perfectivi). But in every being there are two things to consider, namely the very nature of the species (ipsam rationem speciei), and the existence itself (esse ipsum) by which something subsists in that species. And thus a being can be perfect in two ways. In one way according to the nature of the species alone. . . . In another way being is perfective of another not only according to the nature of the species, but also according to the existence which it has in reality (esse quod habet in rerum natura): and the good is perfective in this way.[4]

Here St. Thomas definitely seems to hold that being is good both by its essence and by its existence, but if we look at the answer to the first objection we shall find that he is not saying that being is good by its essence. He states:

> while being is spoken of absolutely, the good adds to it a relationship of final causality; the essence of the thing considered in itself is enough that something be called being because of it, but not that something be called good because of it . . . the essence of the creature is not called a good thing except from a relationship to God by which it has the

[3] Cf. L. Geiger, *La Participation selon S. Thomas* (Paris, 1942), pp. 36, 37, 42.

[4] *De ver.*, XXI, 1.

nature of a final cause. And because of this, it is said that the creature is not good by its essence, but by participation . . . the creature can be called good by its essence in so far as the essence of the creature is not found without a relationship to the goodness of God. . . .[5]

Here then St. Thomas qualifies his statement in the body of the article and says that being is good not by its essence but by participation. Below, we shall see that this participation is the participation of existence but here it is clear that the essence of the creature is not said to be good by St. Thomas.

But it may be thought that St. Thomas is denying goodness to the universal essence and not to the real essence as it is in the being. In the quotation from the body of the article, the contrast he draws between essence and *esse* is not the distinction of essence and existence but between the absolute nature and the nature *in concreto*. Hence his answer to the first objection does not prove that he held the concrete essence not to be intrinsically good but only that the absolute nature is not good of itself.

Admittedly, it is difficult at times to know what St. Thomas means by *esse*. It definitely does mean essence for him at times,[6] but here in the body of the article we should take it to mean existence or existential act. The reason is that he is contrasting it with the *natura speciei* here, and he says that the thing is made perfect by this *natura speciei*. A being is not perfected by the species considered *ante rem* but only as concretely informing the being. Moreover, in the body also, he says that being is perfective of the intellect only by this nature and so this nature is the truth of the thing (i. e., the principle by which being has a proper relation to an intellect as measuring it or as being measured by it). If this is so, St. Thomas is not merely referring to the *ratio* as prior to the being but to essence as

[5] *De ver.*, XXI, 1, ad 1.

[6] Cf. *In I Sent.*, d. 19, q. 5, a. 1; d. 33, q. 1, 1, ad 1 where St. Thomas shows that one of the meanings of *esse* is quiddity.

it is a real act informing the being since a being does not have a relationship to an intellect except by this act intrinsic to it. Therefore, St. Thomas is drawing the distinction between real essence and existence in the body of this article, and in the response to the first objection, he is rejecting the intrinsic goodness of the real essence.

In another place St. Thomas says that essence is both one and good,[7] but here too the context will show that he does not mean that essence is intrinsically good. The reason he makes this statement is that there are some general predicates which inseparably participate in the nature of being such as the one, the good and like perfections and since essence is being, we can say that essence is good. But one can see that just because goodness is inseparably connected with being, it does not mean that essence is intrinsically good any more than the inseparable connection of existence with being demands its identity with essence.

Although in some texts we may be uncertain of St. Thomas' opinion, in others he is too definite to be misunderstood. For instance in one place he states, "every being is one through its essence, but not good, as has been shown."[8] Here, St. Thomas is contrasting the principle by which being is good with the real essence, for it is only by the real concrete essence that a being could be said to be ontologically one.

If we look for his positive statements on this doctrine, our conviction that he holds that being is good properly by existential act grows. To give several statements of his position we cite the following:

the good is that which all things desire . . . but all things desire to be

[7] *De ver.*, XXI, 4, ad 4. Cf. also *ibid.*, 2; 3, ad 3; 6.

[8] *Summa Theol.*, I, 6, 3, ad 1. Cf. *ibid.*, ad 2, "licet unumquodque sit bonum inquantum habet esse; tamen essentia rei creatae non est ipsum esse; et ideo non sequitur, quod res creata sit bona per suam essentiam."

in act (esse actu) according to their measure, which is clear from the fact that everything of its nature shrinks from corruption. To be in act therefore (esse igitur actu) is the essential notion of the good.[9] The essence is not said to be good through an unqualified consideration of the nature, but according to its existence (esse); for humanity does not have the nature of the good or goodness except in so far as it has existence. The divine nature or essence itself is its existence; but the nature or essence of no created thing is its existence; rather it participates existence from another.[10]

the good is everything that is appetible: and thus, since every nature desires its own existence and its own perfection, it must be said that the existence and perfection of any nature fulfills the essential notion of goodness (rationem habeat bonitatis). . . . And therefore it is said that evil is neither existing, nor a good. Because being is good in so far as it is being, the removal of both [i. e., existence and good] is the same.[11]

These quotations show that St. Thomas holds that *esse existentiae* is the principle which makes being ontologically good. This is not contrary to his assertion quoted above that being is good by participation in final causality, but it is an explanation of how the creature does participate in final causality. The creature is placed in the order of final causality in so far as it is the object of God's creative love since the divine love is creative of goodness, and it is by this created goodness which inheres in creatures that the creature participates in God's uncreated goodness. But the creature is the object of God's

[9] *Sum. cont. Gent.*, I, 37.

[10] *De ver.*, XXI, 5. Cf. *ibid.*, ad 1, "Et praeterea ipsa bonitas quae attenditur secundum esse substantiale, non est ipsa essentia rei, sed esse participatum."

[11] *Summa Theol.*, I, 48, 1. Cf. also *De pot.*, III, 6, "Esse autem in quantum huiusmodi, bonum est: quod patet ex hoc quod unumquodque esse appetit, in quo ratio boni consistit, scil. quod sit appetibile," *De ver.*, XXI, 1, ad 6; ad 2 of *sed contra;* 5, ad 1; XXII, 1, ad 4, "Si tamen ad aliquod unum bonum determinetur, hoc unum erit esse . . ."; 2, ad 2; *Summa Theol.*, I, 5, 1, and Cajetan's commentary on this but especially his commentary *In Summa Theol.*, I, 82, 3, XIII.

creative love in so far as it exists, and thus it participates in the goodness of God properly through its existence.

This becomes clearer if we see the relation between existence and the good as a principle from which reality flows, between existence and the will of God. In the first place, the proper nature of a perfection is shown by its most proper effect. Since the proper effect of goodness is *esse* (*bonum est diffusivum sui esse*),[12] we can conclude that being is good on the substantial level properly by *esse* or existence. Secondly, if we examine the creative act in the light of this, we find that we participate in the divine goodness properly by our existence. "Because God is good, we are."[13] It is precisely because God is good and freely exercises this goodness extrinsically that we are; it is not because God is good that we are this or that. Thirdly, the first extrinsic manifestation of the divine will shows most properly the nature of the good, for the proper object of the divine will is the good itself. But St. Thomas agrees with the author of the *Liber de Causis* that "prima rerum creatarum est esse,"[14] and his constant teaching is, "in so far as anything has existence or any good, it is willed by God."[15]

All of this leads us to the conclusion that St. Thomas held that the creature on the substantial level participates in the goodness of God properly by its existential act and that the essence of the creature is good in so far as it participates in existence. Since the essence of the creature is distinct from the existence of the creature, it is not intrinsically good.

We can offer a proof for our thesis in this way. In the first place it is possible that the fundamental proper cause of the goodness of creatures be distinct from the fundamental

[12] Cf *Summa Theol.*, I, 5, 4, ad 2. This is a commonly accepted dictum in the works of St. Thomas.

[13] *Ibid.*, the 3rd objection.

[14] *De ver.*, XXI, 2, obj. 5.

[15] *Summa cont. Gent.*, II, 70; cf. *Summa Theol.*, I, 5, 3, ad 4; 46, 1 ". . . esse mundi ex voluntate Dei dependent sicut ex sua causa."

cause of the truth of creatures. It is true that these transcendentals are distinct from being only by a distinction of reason, but it is possible that they be really distinct from each other because of the radical division within creatures. If the fundamental cause of the truth of creatures is the essence and the fundamental cause of the goodness of creatures is the existential act, these transcendentals are distinct from each other yet are not distinct from being.

But this is the case. That being is true by its essential principle is apparent from the very nature of ontological truth. A thing is true in so far as it is either measured by an intellect, the essential truth, or measures an intellect that is dependent on it. But a thing is measured by an intellect in so far as its form is determined by an intellect; it measures an intellect in so far as it determines an intellect to know this rather than that; and this determination comes properly only from its essence and formal attributes, not from its existence.[16]

[16] St. Thomas in many places shows that ontological truth, or rather the fundamental cause of the ontological truth, consists in the form of beings rather than in their existence because a being is properly measured by an intellect through its form and measures an intellect through its form, since to know is to possess the *forms* of things in an immaterial way. Thus he says, "cum omnis res sit vera, secundum quod habet propriam formam naturae suae" (*Summa Theol.*, I, 16, 2) and "Verum autem, quod est in rebus, convertitur cum ente secundum substantiam" (*Summa Theol.*, I, 16, 3, ad 1) and a thing is true "secundum quod habet esse conformabile intellectui" (*Summa Theol.*, I, 16, 5). This *esse* is the formal reality of the being not as merely possible but as a real form *in rerum natura*. It is not the existence because existence is not a quality or a "suchness" and only a quality can be said to be conformable to an intellect. "Et quia omnia naturalia comparantur ad intellectum divinum, sicut artificiata ad artem, consequens est ut quaelibet res dicatur esse vera secundum quod habet propriam formam, secundum quam imitatur artem divinam. . . . Et hoc modo ens et verum convertuntur, quia quaelibet res naturalis per suam formam arti divinae conformatur." (*In I Perih.*, 3). It is true that St. Thomas says in one place, "Cum autem in re sit quidditas eius et suum esse, veritas fundatur in esse rei magis quam in ipsa quidditate, sicut nomen entis ab esse imponitur; et in ipsa operatione intellectus accipientis esse rei sicut est, per quamdam similationem ad ipsum, completur ratio adaequationis, in qua consistit ratio veritatis." *In I Sent.*, d. 19, q. 5, 1.

That being is good properly only by existential act can be seen from an examination of the characteristics of goodness. In the first place, the good is a dynamic principle of activity because it is the very reason for activity as such. It is the reason for activity in the sense that each thing acts for an end or for a good. The very reason for activity on the part of any being must itself be even more dynamic than this activity which it causes. But it is the existential act which is a dynamic act including eminently within itself all activity. Hence the goodness of being must be due properly to existential act. Secondly, for the same reason, the good is the most actual principle since it is the cause of all acts. And since existential act is the most actual principle the same conclusion follows. Thirdly, the good allows a diversity of degrees even in the same essential order while an essence is as a number, admitting neither more nor less without becoming something else. This diversity of degrees is proper to the existential principle of being, and hence being is good by existential act. Lastly, the good in creatures is participated, as the light of the air participates in the illumination of the sun. It is to describe this mode of participation that St. Thomas at times says that in God there is goodness and in creatures the diffusion of goodness. But this is the way in

Here too, I submit, St. Thomas is using *esse* for the concrete essence in contrast to the universal quiddity or the quiddity *ante rem* and not for the existence in contrast to the essence. This follows from the many other statements of St. Thomas where he unequivocally reduces the truth of things to the essence and also from the fact that he says the intellect receives this *esse* and by it has a certain likeness to the thing, but it is not his theory of knowledge that the intellect receives the existence of the object. Moreover, the intellect receives a likeness by a determination of form, and not properly by a "to be" since this is not a determining act. In *De ver.*, XXI, 1, he directly denies that *esse* of the object is the foundation for the truth of the object. We may conclude then, that the real essence is the fundamental cause for the truth of things, while existence is said to be the basis of truth indirectly and improperly in so far as the form is perfected in the order of being by this ultimate act, and in so far as the form cannot be known by the intellect unless it is given an intentional existence by the agent intellect.

which existence is participated, while essence is participated as an image or likeness participates in the original, analogically of course. Hence this attribute of the good also leads us to the same conclusion, namely, that being is good properly by existential act. However, just to say that existence is the goodness of being would not be completely accurate. Goodness is a relative transcendental; so it is better to say that existence, in so far as it is the foundation in being for being's relationship of appetibility to a will, is the goodness of being.

From the fact that being is good by existential act, it follows that the proper object of the will is existence or "to be," although a "to be" proportionate to the will, since the proper object of the will is the good. And this together with the distinction between the goodness and the truth of being is shown by the very way in which we speak about the object of the intellect and the object of the will. We say, "I know something," "I know him," or "I know *that he exists*," etc. But in referring to the activity of the will, we say, "I want to be," "I want to have," or "I love to act," etc. The object of the intellect is expressed by a noun or a noun phrase even when it involves existence, while the object of the will is expressed by an infinitive phrase. If we do place an infinitive after the "I know," it expresses not a direct object but purpose, a relation to the will. This is at least a sign that the proper object of the intellect is the forms of things—for the forms of things or things considered formally are expressed by a noun—while the proper object of the will is existential act or existence, since the existential act is expressed by the infinitive.

This is not to say form is good in no way or is in no way the object of the will. Form can be called the good of the intellect as fulfilling its natural appetite for knowledge, though properly speaking being is said to be good in relation to the will and not in relation to the faculties of knowledge. Form is also an object of the will as specifying the act of the will,

but since the form or essence is not intrinsically good, the will only loves or desires a particular form for the sake of existence, one's own existence or another's, to conserve it, to grow in it, or to rejoice in it. In much the same way as the intellect knows matter only through form because matter itself is not intelligible, the will desires form only for the sake of existence.

The objects, then, of both the intellect and the will are existential but not in the same way. The object of the intellect is being really existing outside the mind, i. e., existents or existing beings, but the intellect is united to beings through their forms. On the other hand, the will's proper object is existence itself and only secondarily forms. I wish to note very clearly that I am by no means denying the objectivity or the external character of the direct object of the intellect, nor am I relegating it to the merely possible order. Again, I am not denying all value to the essences of creatures. Rather I hold that the essences of creatures are the prime value for the intellect, but as a value for the will they are secondary to existence.

John of St. Thomas seems to have been led to his position that being is good by its formal perfection through his understanding of existence. He seems to have considered this as something superadded to being and not that which constitutes a being ultimately, or that from which a being derives its beingness. Also, he held that the good could exist or not exist. If this were the case, obviously being would not be good by existence. But it is the doctrine of St. Thomas that the good is extended to non-being only as a cause; the good itself is inseparably united to being [17] and indeed, as the texts quoted above show, is the very actuality of being. It is true we can be attracted to an end that does not as yet exist *in rerum natura,* but such an end does have an intentional existence, as will be shown in the next section, and attracts the will through that.

[17] Cf. *De ver.*, XXI, 2, ad 2; 4, ad 4.

Geiger's position is based on the principle that the universal extension of the good demands that not only every being is good but that every principle of being is good and, moreover, intrinsically good. St. Thomas does say that every being in so far as it is being is good, but he does not say that the universal extension of goodness demands that the essence of the creature be intrinsically good. It is good by participation as it exists by participation. Another basis of this opinion is Geiger's interpretation of St. Thomas to the effect that the distinction between the true and the good is the distinction between the universal and the particular. Although this is favored by some texts, it is more accurate to say that ontological truth for St. Thomas is not the universal essence but the actual essence and all the formal perfection *in rerum natura* as we have tried to show briefly above.

II. The Presentation of the Good to the Will

The problem central to this paper can now be treated. It is this: How is this existential act, "to be," "to have," "to act," etc. present to the will? We have seen the necessity for positing this problem, and now we will examine, in order, the sense faculties of knowledge, the knowing intellect, and the active intellect to see which can fulfill the function of presenting the goodness of being to the will.

i. The Sense Faculties

These cannot present existence to the will because their object is not existence. Their objects are forms which are actual and particular. The senses do have an immediate intuitive apprehension of existence in the wider sense of the word, i. e., of existents or of actual concrete forms. It is true that the eye does see the actual color; the ear does hear the actual sound. Nevertheless, sensible forms, though they are

infallible indices of existence, are really distinct from the "to be." Their object is limited to forms and hence they cannot as such present existence to the will. Moreover, they are not proportioned to the will which is a spiritual faculty and *per se* directed to *esse* itself or *bonum in communi*, and not to this or that sensible *esse*.

ii. The Possible Intellect

The problem of whether the possible intellect can present existential act to the will is the same as the question of how the intellect knows existence, for it can only present existence to the will if it knows it and as it knows it. How, then, does the intellect know existence? We are sure that the intellect does knows existence since it expresses existence in the strict existential judgment. There is corroboratory evidence for this in the fact that being is good by its existential act, and it is the commonly accepted doctrine of Thomists that the intellect presents the good to the will. For instance, St. Thomas says, "Therefore the intellect moves the will in the way in which the end is said to move, in so far as it knows what the end is [*rationem finis*], and presents it to the will." [18] We shall present several opinions explaining how the intellect knows existence and then attempt to approach the problem as such.

Gilson's initial position elaborated in *Being and Some Philosophers* was that existence was not known in the first act of the intellect, the act of abstraction or apprehension. He wrote that simple intellection or conception "happens when our intellect forms the quiddity of a thing." [19] It is because this initial

[18] *De ver.*, XXII, 12. A modern statement of it is given by Fr. Sullivan who says, "The intellect is prior to the will in the sense that it presents the will with its object. This object and its presentation are by way of final causality, so that the understood good is prior to the act of the will as the final cause is to its effect." "Natural Necessitation of the Human Will, Conclusion," *The Thomist*, XIV (1951), 506.

[19] E. Gilson, *Being and Some Philosophers*, 2nd ed. (Toronto, 1952), p. 190.

intellection of the mind has as its object the essences of things that existence cannot be conceived; the "to be" is not an essence. Existence is known in the complex conception, or in the judgment and properly in the existential judgment. ". . . such a judgment intellectually reiterates an actual act of existing. If I say that x is, the essence of x exercises through my judgment the same act of existing which it exercises in x." [20] And since all real knowledge is a union of both abstraction and judgment, it always includes a knowledge both of essence and of existence.

Régis criticized this view because it supposed that existence was not known in a concept and was not the fruit of the first act of the mind. He established by quotations that St. Thomas held that the verb is grasped in the act of understanding. For instance he quotes St. Thomas as saying, ". . . the meaning of a sentence differs from the meaning of a noun or verb, because a noun or a verb means a simple understanding, but a sentence means a composite understanding." [21] Thus the verb is known in the first operation of the mind and not first of all in the judgment. "Consequently the knowledge of existence is had *through* and *in* a concept in Thomism, not a noun concept but a verb concept." [22] This is possible, Régis continues, because a concept does not have to be abstract. "Neither the concept of being as a noun nor that of being as a verb can be the result of an abstraction." [23]

The position of Klubertanz, on the other hand, seems to be directly opposed to this for he says that the object of the first act of the intellect is the absolute nature, and existence is known first of all in the judgment. He concludes from a study of the doctrine of St. Thomas:

[20] *Ibid.*, p. 203.
[21] *In I Perih.*, 6, 2. Cf. also *ibid.*, 5.
[22] Gilson, *op. cit.*, Appendix, p. 220.
[23] *Ibid.*

> First, "intellectus" and "intelligere" (that is, the concept or simple apprehension), can grasp only the absolute nature or essence of material things, but not the material singular. . . . Moreover, the intellectual knowledge of the material singular is, in the first instance at least, a judgment. The simplest reason for saying this is that particulars, and only particulars, exist, and the act of existing is known, and in the first instance only known, in the judgment.[24]

For Klubertanz, the existential judgment could only occur after a reflection of the intellect upon the phantasm to gain a knowledge of the singular. This is the avenue by which knowledge of existence comes to the intellect.

Maritain's understanding of the genesis of the existential judgment differs somewhat from those we have stated. He holds that "essences are the object of the first operation of the intellect." [25] Moreover, he grants that there is a *concept* of existence, but in this concept existence is presented as an essence, so this is not the principle of the existential judgment nor is it the proper way by which the intellect knows the "to be" of the thing. The reason for this is that the existential judgment is a composition of the object of thought not with the existence as an essence but with it as an existential act. How then is this act of existence possessed by the intellect if not through conception or apprehension? When there is sense knowledge of an existent, there is a judgment of the external and estimative senses that is equivalent in a blind way to the intellectual judgment, "this exists." Simultaneous with this sense judgment there arises in the intellect both the concept of being and the judgment that this particular being exists. This judgment is simultaneous with the intellect's apprehension of being and its reflection upon the singular, but it does not derive from either of these.[26]

[24] G. Klubertanz, "St. Thomas and the Knowledge of the Singular," THE NEW SCHOLASTICISM, XXVI (1951), 162, 165.

[25] J. Maritain, *Existence and the Existent* (New York, 1948), p. 23.

[26] *Ibid.*, pp. 26-7, n. 13.

In this knowledge of existence there seems, in my understanding of Maritain's position, to be a leap from the sense order to the intellectual order that does not occur through abstraction. It seems that the senses react to their sense apprehension by a blind affirmation of existence, and the intellect, because it is a power of the same supposit as the senses, is, as it were, borne along by the blind judgment of the senses to an experience of this existential act. This very experience is the intellectual existential judgment or an intellectual imposition of existence upon the object as known. So this intellectual judgment of existence has the direction from the knower to the object and arises from a certain sympathy with the senses' blind judgment of existence.

These different theories show definitely that this question is a very complex problem, but let us examine the various acts of the intellect to see whether they can offer a solution to it, or bring light to bear upon this mystery.

The first act of the intellect is the act of simple apprehension. To understand whether this presents "to be" to the intellect, we must make a distinction. Objectively, in the being, besides the *esse existentiae* which makes the thing simply to be, there is an *esse essentiae* which is at the same time an act in the order of essence and a potency for the further act of existence. Subjectively, we must distinguish the actual form that is known from existence. The actual form is not a merely possible essence with no relation to the existing thing; rather it is the intelligibility of the object which is potentially intelligible in the object itself and is made actually intelligible by the agent intellect. This is given to us in the initial act of apprehension in so far as the *species impressa* is abstracted from external reality itself. St. Thomas constantly teaches that in this first act, the intellect knows only the quiddities of things. Moreover, these quiddities have been abstracted from singular matter and so are universal. For instance, he says, the intellect "under-

stands by abstracting the intelligible species from matter of this kind [i. e., singular] but what is abstracted from singular matter, is universal; so our intellect directly knows nothing but universals." [27] To deny this by saying that the first object of the intellect is not necessarily abstracted, or that it is the existential act itself would be to reject the Thomistic doctrine of abstraction and the *species impressa*.

The psychologically first object of the intellect is being. However, considered only as known through abstraction from the phantasm and as the first thing known directly by intellectual apprehension, being is not the "essence-to be composite" but the essence alone, or in other words, at this stage of knowledge, being is known only through the form and not through its "to be." The perfection of our knowledge of being is found only in the existential judgment. Only here is being known as the essence-existence composite. The reason for this is that every concept is a form and hence cannot properly present to the mind the existential act. There is a concept of existence, but this is not the proper way in which existence is known. Only an existential act itself can be the proper medium by which we know existence as such. Besides, our knowledge of being as such is proportioned to our own being. As we ourselves are composed of essence and existence both on the level of substance and on the level of operation, our knowledge of being as such will itself be a composite knowledge; it cannot be attained in the simple act of apprehension.

We must concede to Régis that the verb "to be" is simple and so cannot be grasped first of all in the existential judgment which is a composite act. A grasp of existence is somehow presupposed by the existential judgment which is a predication of existence of some actual being. But we deny that the only alternative left to us is to say that it is known properly by

[27] *Summa Theol.*, I, 86, 1; cf. *De ver.*, II, 6; *In Boeth. de Trin.*, V, 3.

simple intellectual apprehension since, as we have shown above, the first object of the intellect is the essences of things. We grant that the texts Régis advances prove that St. Thomas said, at least in commenting on Aristotle, that knowledge of the *verb* is in and through the concept and occurs in the act of simple understanding. However, it is not certain whether St. Thomas was presenting this as his own doctrine or as the doctrine of Aristotle. Furthermore, if this is extended to mean that "the knowledge of existence is had through and in a concept," we cannot see how this can possibly be harmonized with St. Thomas' frequent teaching on the abstractness and formal character of the first object of the intellect. We admit that there is a concept of the verb and of the "to be," namely, existence, but this is the verb presented in an abstract and formal way. To say that "to be" is known properly through a concept is either to make "to be" a quiddity or to change the Thomistic doctrine of the concept in the first act of the mind. If Régis' interpretation of the text of St. Thomas is correct, the reason advanced in the text is not probative. The reason why "to be" is said to be known in the first act is because of its simplicity. But this only proves that "to be" must be grasped in a first act of a spiritual faculty. Below we shall explain how, in our opinion, it is grasped in the first act of the will. This answer would at the same time explain the simplicity of our grasp of existence, would not contradict St. Thomas' teaching on the formal object of the intellect, and would be consistent with his teaching on the proper object of the will.

The "to be" is, therefore, not known in the first act of the intellect. Neither is it known by the intellect and the sense faculties of knowledge combined. This explains in part the knowledge of the singular, but since neither the intellect nor the senses grasp "to be" in the act of apprehension, it cannot be the explanation of a proper knowledge of existence. For the same reason, knowledge of the "to be" is not offered by

the reflection of the intellect upon the phantasm and upon the singular through the phantasm. This again offers an explanation for our knowledge of the singular, but not for our knowledge of "to be." Existence is necessarily implied by the sensible form but it is not contained in the form as identical with it or as the proper object of knowledge.[28]

The existential judgment does manifest a knowledge of existence. This judgment should be kept distinct from the judgment of attribution of a form or quality to a being, and not confused with merely objective knowledge, or knowledge of the singular; for the existential judgment is properly a predication of "to be" of a thing. This demands some explanation, and it is not explained by the initial act of the intellect or by reflection on the singular. Maritain's explanation remains. This is an attempt to explain the origin of the existential act in the intellect by a way other than abstraction and reflection of the intellect upon the singular, and as such it is unique and valuable. But it is not at all clear what the blind judgments of sense are or how these are related to sensible perception. Furthermore, it is not clear how this experience or blind judgment is transferred to the intellectual order since such transference is not through abstraction. Nor can this problem be solved by means of introspection alone; it is a metaphysical problem, and its answer must be firmly based in and drawn from metaphysical principles. Since the approach of Maritain seems to be that of introspection, it can point the way, but cannot be the ultimate solution.

The problem with which we are faced, then, is this: are we to explain the intellect's judgment of existence by the act of the will, or are we to explain the act of the will by the intellect's judgment of existence? We have seen that the knowledge of existence cannot be explained by the intellect or by the senses taken either singly or together. Moreover, we have seen that the

[28] Gilson, *op. cit.*, p. 220.

proper object of the will is existence as the goodness of being. Hence we would say that the intellect receives its knowledge of existence through the experience of the will except for this difficulty: the intellect presents the good to the will, so the intellect must know existence before the will experiences it. This leads us to an examination of the agent intellect.

iii. The Agent Intellect

Is the act of the agent intellect a medium by which being can be presented to the will in its goodness? Can it present to the will the existential act of the object in a way analogous to that in which it presents to the possible intellect a *species intelligibilis* or vicarious form? The species itself which the agent intellect abstracts, since it is a form, cannot present the goodness of the object to the will, but can the *proper act* itself of the agent intellect present this goodness to the will? The agent intellect, through the species, presents to the intellect the external reality, for it is the external reality that is the first object of the intellect. But the first object of the will is not some external object. Rather it is the personal existence of the one who wills. The first object in the psychological order that attracts the will is not some external good but the existence of the person himself; other things are loved with relation to this. So our problem more specifically is this: can the agent intellect present to the will the personal existence of the individual appetitive being, and can it present other good things in their relation to this personal existence?

We cannot present within the limits of this paper the complete doctrine of St. Thomas on the act and nature of the agent intellect, nor can we discuss in full its relation to the phantasm, to the possible intellect, and to the substance itself. Our investigation must be limited to determining what sort of act St. Thomas considered the act of the agent intellect to be.

There are two possibilities. Since the act of the agent intellect is a metaphysical act in the spiritual order and there are only two metaphysical acts ultimately, the formal act and the existential act, the act of the agent intellect is either a formal act, or it is an existential act. That is, since the agent intellect is a spiritual power actively diffusing act, this act is either a determining act, a form, or an act giving " to be " proportionate to its own perfection. Analysis of St. Thomas' thought makes it clear that this act is not a formal act but an existential act, bearing in mind, of course, the analogous character of existential act. He does not say this expressly because he did not treat the agent intellect's relation to the phantasm and to the possible intellect in terms of essence and existence but in terms of causality and the more general terms of act and potency. With the problem stated in these terms, the agent intellect is naturally not expressly said to be an existential act. However, that this is what St. Thomas meant is a necessary deduction from his doctrine on the agent intellect. So our method in the examination of his thought will be to give his different pertinent statements on the act of the agent intellect and to show how these necessarily demand the existential character of this act.

The very reason why Aristotle posed the agent intellect demands that its act be an existential act. As St. Thomas says:

> Aristotle was induced to posit an agent intellect to exclude the opinion of Plato who held that the quiddities of material things existed separate from matter and as actually intelligible; so it was not necessary for him to posit an agent intellect. But because Aristotle held that the quiddities of sensible things existed in matter and not as actually intelligible, it was necessary that he posit some intellect that would abstract them from matter, and thus make them actually intelligible.[29]

Plato was correct in his basic principle that essences had to be in a state of actual intelligibility if they were to be known by

[29] *In III de Anima.*, 10, n. 731. Cf. also *ibid.*, I, 5, n. 85; *In III Sent.*, d. 31, q. 2, a. 4; *De spir. creat.*, 10, ad 17; *De ver.*, X, 6, ad 7; *Summa Theol.*, I, 54, 4; 79, 3; 4; *Sum. cont. Gent.*, I, 65.

man. Aristotle, since he rejected Plato's theory of ideas, had to supply a theory which would give these quiddities a "to be" in the state of actual intelligibility within man, for forms cannot be actually intelligible unless they are actualized by a "to be" of a proportionately intelligible degree of perfection. To put it in another way, existence is the actuality of forms, so forms cannot have an actuality on the intelligible level unless they have an existence or a "to be" on the intelligible level. Since the function of the agent intellect is to make quiddities actually intelligible it must, in abstracting the forms from the phantasms, give them an existence on the intelligible level. But only an existential act, not a formal act, could perform such a function. Therefore, the act of the agent intellect is an existential act.

An examination of the terminology of St. Thomas will lead to the same conclusion. He uses several different metaphors to bring out the nature of this act. The agent intellect is said to make the species as an artist, or to abstract the species from the phantasm, or to illumine the phantasm. None of these metaphors can of itself express adequately the different aspects of the act of the agent intellect so St. Thomas uses them all. He says the agent intellect makes the species to express its function as an efficient cause. Abstraction indicates the relation of the species which is made to the phantasm, its origin. And illumination expresses the means by which it is abstracted. In a doctoral dissertation on the agent intellect, Carney examines the uses of the words St. Thomas employs and concludes:

> . . . when St. Thomas speaks of the agent intellect as a maker, he conceives of it as making the form, which exists outside the soul with a material existence and in the phantasm with a sensible existence, *to exist* with an intelligible or immaterial existence. . . . What the intellect agent does is to raise it (the form) to a higher degree of *existence*. . . . The very process of abstraction is one of giving the species an *immaterial existence* by withdrawing it from its material conditions.[30]

[30] W. Carney, S. J. *Agent Intellect and Phantasm: Their Relationship*

It is the notion of giving existence that unites the metaphors St. Thomas uses in a higher synthesis, but we know that a formal act cannot give " to be "; the only act that can give existence is an existential act or " to be," so the act of the agent intellect is an existential act properly.

An analogy between the essence-existence relationship in beings and the relationship between the phantasm and the agent intellect in the intentional order will show that the agent intellect's act must be existential. The form or essence *in rerum natura* is real but of itself not actual in the order of being. It receives its actuality from the " to be " and it is by this that it is able actually to determine or exercise its own proper act. In the intentional order, the form in the phantasm has an *esse sensible* and therefore is actually sensible, but it has no *esse intelligibile* and consequently is not actually determining on the intelligible level or actually intelligible though it is potentially intelligible. It can become actually determining on the intelligible level only by an *esse* which has a spiritual degree of perfection. Actualized by this, it looses its material notes of individuation. We can note that whereas *in rerum natura* the form was somehow prior to and the measure of the degree of its existential act, in the intentional order the existential act is prior to the form and in some way the measure of the spirituality of the form. Thus the act of the agent intellect is a " to be."

in the Teaching of St. Thomas and His Commentators, unpublished dissertation (Washington, D. C., Georgetown University, 1950), pp. 46-7. The underlining is my own. Cf. also other places where he shows that St. Thomas and the commentators hold that the agent intellect has this strictly existential function as pp. 43, 66-8, 96, 147-8, 176, 178, *passim*. Some of the texts he examines are *In III de Anima*, 10, n. 739; *Summa Theol.*, II, 73, 75, 76; I, 12, 13; 79, 3; *De Anima*, 18. Much of the confusion and difference of opinion on the function of the agent intellect among the commentators is probably caused by the fact that too much value is given to the metaphors St. Thomas uses and by the explanation of the act of the agent intellect in terms of causality, not in terms of essence and existence.

St. Thomas' use of the analogy of light to clarify the nature of the agent intellect leads us to the same conclusion. For instance he says, "These [the phantasms] are compared to the possible intellect as colors to sight, but to the agent intellect as colors to light." [31] As bodies are colored before they receive the light of the sun and yet are only actually colored when the light shines upon them, so the species in the phantasm is intelligible before it receives the light of the agent intellect but actually intelligible only when this light illumines it. St. Thomas also uses this analogy to show that the agent intellect itself is not a determining principle for he says in commenting on Aristotle:

> For if the agent intellect had in itself the determination of all intelligibles, the possible intellect would not need phantasms, but by the agent intellect alone it would be reduced to the act of all intelligibles and thus it would not be compared to the intelligibles as the maker to the thing made, as the philosopher states here, but as being the intelligibles themselves. . . . In this way also light makes colors actual, not that it itself has the determinations of all colors in itself.[32]

Now the existential character of the act of the agent intellect is shown here in two ways. In the first place, St. Thomas uses the same analogy to express the reception of existence by forms in reality. He compares the existential dependence of creatures upon God with the dependence of the illuminated air on the illuminating sun and accepts Aristotle's analogy between the agent intellect and the light that is received in the air.[33] Secondly, he expressly says that the agent intellect is not determined. Therefore, it cannot be a principle of determination, i. e., a formal act, but it must be an existential act. If it were a form itself, all our knowledge would be changed formally by a preconscious power and we could never know whether what

[31] *Summa Theol.*, I, 54, 4, *sed contra.* Cf. also 79, 4; *In III de Anima*, 10, n. 730; *In II Sent.*, d. 17, q. 2, a. 1; *Sum. cont. Gent., II*, 77; 78; III, 43.

[32] *In III de Anima*, 10, n. 739.

[33] Cf. *Summa Theol.*, I, 104, 1; 79, 4; *Sum. cont. Gent.*, II, 54.

we knew was what was actually *in rerum natura* or whether it was due to this agent intellect. To say it is a formal act, therefore, is to make it the diabolical spirit of Descartes or at least to admit innate knowledge.

An analysis of the properties of the agent intellect leads to the same conclusion. St. Thomas does at times call the agent intellect a form or quality as when he says, " Therefore, in the human intellect a certain light is in a way a quality or permanent form, namely the essential light of the agent intellect," [34] but he is careful to call it here a quality " in a way " (*quasi*), and where he treats it elsewhere he is insistent on qualifying it as a habit only in the sense that light itself is a habit. It has the *permanence* of a habit or quality, but it is completely active as no strict habit is. A habit is first act with respect to the operation itself, but the light of the agent intellect which St. Thomas calls a quality or habit, is second act. Furthermore, the act of the agent intellect is impassible (*nullo modo patiens*)[35] and always in act since it is more noble than, though proportionate to, the possible intellect.[36] Now formal act is not completely active for it is potential to existence; neither is it *nullo modo patiens* for it receives existence. It is only the existential act itself which fulfills this description St. Thomas gives of the act of the agent intellect. So again we must conclude that the act of the agent intellect is an existential act.

Does this act of the agent intellect solve our central problem? Is it able to present being in its goodness to the human will? To do so it must (1) present existential perfection to the will, (2) present this as the perfection or desirability of the object, and (3) in such a way that this good is grasped in its relation to our own existential perfection. The first is necessary for we

[34] *De ver.*, XII, 1. Cf. *Sum. cont. Gent.*, II, 78; *In III de Anima*, 10, n. 730; *De virt.*, III, 2, 5.

[35] *Summa Theol.*, I-II, 50, 5, ad 2.

[36] *In III de Anima*, 10, n. 733.

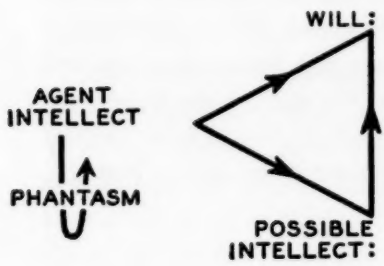
cannot love the good unless the good is present to our will. The second and third are necessary since in every act of the will we desire both the object itself and our own perfection.

Yes, this act does fulfill all the necessary conditions for it presents an entitative or existential act to the will. It presents this as the perfection or desirability of the object since this existential act is the intentional existence of the being itself; it is the *esse* of the species or of the *forma vicaria* of the being. Since the act is a spiritual act, it presents the goodness of the object in a way proportionate to the will. But it is not only a spiritual act. The act of the agent intellect is a dynamic act that has a twofold direction, one towards the phantasm and the other towards the spiritual faculties of the soul. Since it has an intimate relation to the object in the phantasm, by its dynamism it presents the goodness of the object not only in a way proportionate to the will but proportionate to the *esse sensibile* of the object. Only because it is an existential act can it establish such a continuity between the spiritual powers and the sensible powers, and only because of this continuity can it present the complete goodness of the object both in the sensible and in the spiritual order. Moreover, this act presents this goodness in its relationship to the personal perfection and goodness of the one who loves, for the act of the agent intellect emanates from the person himself. This is shown from the fact that causality is an effusion of *esse,* and the agent intellect is an efficient cause, analogously, within man. The *esse,* therefore, which it presents to the will has an intimate relation to the person since it is a "to be" on the accidental level that results from his own being on the substantial level. It emanates from substantial existence properly since it is an existential act itself. Therefore, the act of the agent intellect is the proper medium by which the goodness of the object is present to the will. This "goodness of the object" includes the goodness of the person loving, since this is the first thing desired, and the

goodness of the extra-personal object together with its relation to the existence of the person loving. (We should note here that we are investigating the conditions for the psychological process of the love of concupiscence and not the love of benevolence or friendship. This nobler form of love will have basically the same psychological process, but there will be some difference also.)

The will cannot, however, be reduced to act merely by this actuation. As *in rerum natura* existence does not exist unless it exists in a form proportionate to it, so the will needs not only an existential actuation but a formal actuation. The object must be present to it in a formal way, in the first place, so that the will can be aware of what object the goodness by which it is attracted belongs to; the will does not just desire good but desires this good, both in first proximate act and in second act. In the second place, the will cannot just perform act but must perform or execute a certain act. Goodness itself is its proper object, but goodness always exists in beings, so the will must receive a two-fold actuation. It receives from the possible intellect a form or formal cause. It receives from the agent intellect an *esse* or its final cause. The general Thomist position, then, that the possible intellect presents the end to the will can be sustained if by end is meant the *finis operis* or what is done but not if the end properly speaking, the good in its very desirability, or the *finis operantis* is meant. Also, it is to be noted that the good is present to the will before its act: its act is a response to the goodness of being seen as a personal value. The efficient cause of the will's activity is the will itself with this double actuation under the first causality of God which enters intrinsically into the act. But to explain this would extend the paper to too great a length. We can present the double actuation of the will diagramatically as follows. This also shows the actuations of the possible intellect, one an existential actu-

ation to reduce it simply to act and the other a formal actuation to determine it to know this or that.



1. receives from A. I. an existential actuation.
2. receives from P. I. a formal actuation.

1. receives from A. I.:
   a) existential actuation to reduce it to act
   b) formal actuation as object (species impressa)
2. receives from will the connatural or experimental knowledge of existence and goodness.

Let us relate our conclusions concerning the agent intellect and the will to the problem of the genesis of the existential judgment. Here we are not concerned with the mediate existential judgment but with the immediate one such as we make concerning sensible beings that are present to us. Also, we are not establishing the conditions for what we may call the habitual existential judgment. Without a strictly existential relationship with the object, the intellect can judge that a certain object exists because it knows by habitual experience that each sensible being it knows must and does exist. But we are concerned with the immediate existential judgment that results from some grasp of the existence of the being that is known.

As a necessary deduction from our analysis we must conclude that existence is most properly experienced by the appetites, and not known (always taking existence as "to be" and not actual forms). Consequently, the intellect does not make the existential judgment except with the mediation of the appetitive faculties. Hence if we were, *per impossible,* merely intellectual beings and not appetitive beings, we could not know existence. Existence is known by the intellect not properly but in a way similar to what St. Thomas calls judgments of inclinations. We must conclude also from our study that the phrase *nihil est in intellectu nisi prius in sensu* must be completed by the

addition *aut in appetitu* since knowledge of " to be " is received not through the senses but through the appetites. We have established the fact that the appetites are the media through which we make the existential judgment, but a psychological explanation or description of *how* this judgment arises and what conditions are supposed on the part of the object, the sense appetites, and the rational appetites, would be much more difficult and would draw this paper out to too great a length.

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Space and Gravitation *

by James A. Weisheipl, O.P.

THUS FAR IN our study we have considered nature as a spontaneous principle of determined behavior, or behavior which is actually "given" in human experience. Since all such determined behavior manifests an intrinsic intentionality of purpose, congruent activities find their explanation within the beings themselves, while the *raison d'être* of compulsory activity lies in the external force imposed upon nature. Thus in a philosophy of nature, strictly so-called, a fundamental distinction must be made between natural and compulsory movement, for the explanation of these two phenomena is different. Furthermore, we have seen that there is another science, which although considering the same world of nature, reduces all phenomena to quantitative proportions. In this mathematical science of nature spontaneity, finality, and "natural" motion have no meaning, for as such they cannot be quantitatively expressed in the form of equations.

The significance of every science lies in its *explanation.* Every science, if it is to be a science at all, must explain something. It is the different kinds of explanation afforded by the various sciences which distinguish one science from another. This is not to say that every system of philosophy may proffer its own explanation and be just as true as any other explanation. Contradictory explanations of the same phenomenon from the same point of view cannot be equally true. Nature does not tolerate contradictions. But if two sciences look at the same phenomenon from two entirely differ-

* This is the conclusion of a series of three articles. For the other two articles, cf. THE NEW SCHOLASTICISM, XXVIII (1954) 377-408; XXIX (1955) 50-81.

ent points of view, points of view which are both humanly legitimate, then these two sciences are not contradictory but complementary. Such is the case between a natural and mathematical view of nature. It is because the mathematical view leaves out of consideration the underlying structure of reality and considers only quantitative proportionality that its "explanations" differ so radically from the natural philosopher's. The philosopher of nature must accept *everything* which is given in human experience and his explanation will be in terms of value, purpose, causal structure, and experience. The mathematician can deal only with equations in which the variables seem to affect each other as "efficient causes," but which in reality are only "functional dependencies." [1] Thus a mathematical "explanation" is in terms of a variable quantity, or measure, which necessarily affects a dependent quantity. Such an explanation is not interested in the structure of the phenomenon itself but only in indicating the necessary proportionality involved in the measures. It is the element of necessary proportionality, rather than efficient causality itself which is manifest in mathematical "explanations" of nature.[2] This

[1] "To avoid all these dangers of reading metaphysics into physics it might be well to drop the habit of expressing connections between physical properties in terms of causality. In practice what is actually used is a system of *functional dependencies*, and it may be left to other than physicists to decide, if they wish, the extent to which these can be summarized in any law of causality." M. Johnson, *Time, Knowledge and the Nebulae* (London, 1944), p. 35. See also V. Lenzen, *The Nature of Physical Theory* (New York, 1931), pp. 289-290. St. Thomas very frequently points out that mathematics necessarily abstracts from efficient and final causality. Cf. *In III Meta.*, 4, n. 375; *In V Boeth. de Trin.*, 4 ad 7; *Summa Theol.* I. 44, 1 ad 3; *In I Phys.*, 1, n. 5. In Thomistic terminology the causality actually employed in mathematics by means of functional dependencies reduces to extrinsic formal causality, which is a proportion or proportionality between two patterns, or forms. Cf. St. Thomas, *In III Meta.*, 4, nn. 379-381.

[2] Only in this context can one understand the preeminence of "necessity" in the Humean and Kantian search for the foundation of the principle of causality. Cf. D. Hume *A Treatise of Human Nature*, Bk. I, pt. III, sect.

type of explanation is clear in the mathematical theories of gravitation from the seventeenth century to our own day. The big difficulty, however, is that the problem of gravitation needs a much wider explanation than is afforded by mathematics; and history shows that thinkers have tried to reach a physical theory of gravitation—through mathematics.

The problem of gravitation in our day is complicated by two particular factors. First of all, there is the failure to distinguish between the kinds of explanation afforded by natural philosophy and mathematical physics. It is further complicated by a special problem which seems to be equally lodged in both sciences, namely, the problem of space. It is this problem of space which has brought mathematicians to a reconsideration of their classical position, and it is this problem which challenges the traditional position of the Aristotelian philosopher of nature. Since the problem of gravitation involves a change of position in space—heavy bodies falling down and light bodies rising upward—the notion of "space" in some form or other is intricately bound up with the general problem. The background of every mathematical explanation is a "space" in which the equations are verified. What is the reality of space? How does it affect the falling and rising of bodies? Is mathematical space real? Is it the same as natural place? These questions must be answered in the course of explaining gravitation. The most suitable procedure is to treat the problem of space and gravitation in its historical development, considering principally the Aristotelian, Newtonian, and Einsteinian views. Throughout this discussion emphasis must be laid on the nature and rôle of "space" in gravitation and the distinct explanations afforded by natural philosophy and mathematical physics, their validity and relation one to the other.

xiv (Oxford, 1946), pp. 164-170; I. Kant, *Kritik der reinen Vernunft* (Leipzig, 1926), pp. 246-277.

I. Aristotelian Space

The background for the Aristotelian view of space is to be found in his predecessors. Parmenides, denying the possibility of plurality and movement, held that what underlies the illusory world of sense is a corporeal, spherical, continuous, eternal and immutable *plenum.*[3] Parmenides had formed a clear conception of space as Burnet says,[4] but only to deny its reality. The absolute conception of space, the reality of which Parmenides denied, was taken over by Empedocles and filled compactly with bodily elements. Even though Empedocles insisted that all bodies move continually in the *plenum,* so as to leave no void, the *positions* which can be occupied by various bodies remain fixed and absolute.[5] It is as though space with its determined positions were something over and above the bodies which exist. When the atomists introduced the void they gave it a reality equal to that of bodies.[6] Although the void was introduced by the atomists to explain the movement of bodies upward and downward, it was deficient in two respects. First, the void was supposed to be characterless,[7] but a characterless void could in no way influence a body to move upward rather than downward. Second, void itself moved in the void, allowing the vacuous bodies to move upward; but if void moves in void, then they cannot be the same characterless reality, nor can either void explain movement. "What is the cause of its movement? Not, surely, its voidness: for it is not the void only which is moved, but also the solid."[8] Yet in spite of these shortcomings it is clear that the Empedoclean and atomistic void came close to being a fixed framework with determined

[3] Cf. Diels, *Vorsok.*, 28 B.
[4] J. Burnet, *Early Greek Philosophy*, 4th ed. (London, 1945), p. 337.
[5] Cf. Diels, *Vorsok*, 31 B, frag. 17.
[6] Cf. Diels, *Doxog.*, p. 483; J. Burnet, *op. cit.*, p. 337.
[7] *Phys.*, IV, c. 8, 214b28-35.
[8] *De Coelo*, IV, c. 2, 309a27-28.

positions, a reality apart from the bodies which occupied the various positions.

Perhaps Plato was the first to have a clearly mathematical conception of space.[9] For him space, the receptacle of all things, is as real as the eternal ideas and more real than the bodies which occupy it. Plato conceives space as absolutely intelligible dimensions, independent of bodies, but capable of receiving bodies. For example, the dimensions of any room can be thought of independently of the room itself or of anything in it. It is as though *dimensions* were given a subsistence independent of mind and bodies, an absolute framework in which bodies can be conceived to exist. Whether one conceives geometrical figures or physical bodies there is necessarily a framework of dimensionality in which bodies succeed one another in the same place; the "place" of a body is none other than "that part of space which is actually occupied by a body." In other words, Plato conceives space as subsistent dimensionality "separated from any body." [10] That part of space which is occupied by the dimensions of a body is its "place"; and a "vacuum" is that part of space which is not occupied by any body.

Plato's conception of space as subsistent dimensionality is a very human and, therefore, common notion. Whenever we imagine any kind of magnitude whatever, it is set in a framework of unlimited dimensionality. For example, when we imagine a circle, there is room around it for any number of circles; when we see a mountain, we can imagine room for an infinite number of mountains next to it. But what is the reality of this "dimensionality" which is even a condition of our imagining anything physical? Plato made it a condition not only of imagination but of real existence. He projected a condition of human imagination into the physical world and

[9] Cf. Plato, *Timaeus*, 48 E-53 A.

[10] Cf. Aristotle, IV *Phys.*, 2, 209b5-33; St. Thomas, *In IV Phys.*, 3, n. 5; 6, n. 10; 7, n. 3; *In I de Coelo*, 9, n. 3.

made it a subsistent reality in itself—as real as the eternal ideas which it reflects.

But Aristotle rightly objected that there can be no such extension existing apart from bodies.[11] "If there were an extension which were such as to exist independently and be permanent, there would be an infinity of place in the same thing."[12] Since all dimensions are infinitely divisible, each body would be existing in an infinite number of places at once.[13] Dimensionality is the quantitative characteristic of bodies. Unless there is a body which is quantified, there can be no real dimensionality. In other words, dimensions such as length, distance, area, are quantities; these quantities are real provided there is a real body which has these dimensions. If absolute dimensionality really existed apart from the bodies which move about from one place to another, two bodies would always be occupying the same "place"—indeed, the moving body would always occupy an infinite number of places. Furthermore, Aristotle argues that "place" would be continually "changing" with the various bodies which occupied it; but strictly speaking, it is not place which changes but rather the bodies which move from place to place.[14]

The difficulty lies in the fact that we can conceive quantity apart from matter, apart from the real bodies which alone possess quantity. Just as we can think of circles, lines, and numbers apart from any physical body, so too we can think

[11] *Phys.*, IV, c. 4, 211b13-29. Ross thinks that here Aristotle is not attacking the Platonic view of a single space, distinguishable from the bodies that occupy it and move about in it, but the view that inside each container there is a self-subsistent interval specially connected with the container. (Cf. Ross, *Aristotle's Physics, ed. cit.*, p. 56, 572-3). However, it is difficult to see why the position attacked is not that of Plato, as St. Thomas seems to think (IV *Phys.*, lect. 6), especially as Aristotle presents the position, and Ross thinks it "curious" that he does not consider Plato's conception of space (*ibid.*, p. 56).

[12] *Ibid.*, 211b19-21.

[13] Cf. St. Thomas, *In IV Phys.*, 6, n. 7.

[14] *Phys.*, IV, c. 4, 211b23-29.

of distance, volume, and dimensionality apart from any really existing body. But this imagined dimensionality is not a physical quantity; an imagined volume of 500 cubic centimeters is not an existent reality—for nothing can be poured into it. This abstraction from physical bodies is not restricted to mathematical speculation, but is true of any consideration of quantities. Relations of length, distance, area, and the like are commonly discussed, and, indeed, independently of any particular body which actually has those quantities. Nevertheless, for any quantity to be *real* there must exist a physical body which is actually so quantified. We inevitably imagine a universal space, a general dimensionality over and above the bodies existing in the universe, but this in itself does not give reality to space. To have extra-mental reality, space or any other kind of extension must be a physical quantity of real bodies. This point is very important, but it can be brought out only by distinguishing this imaginative space from physical place and mathematical space.

i. Place, Natural and Otherwise

Aristotle rightly showed that Platonic space is of no value in explaining the movement of bodies. Why should one body go up rather than down? In one sense Platonic space is perfectly undifferentiated and characterless, as Plato says,[15] yet in another sense this space cannot be characterless, for otherwise why should a body be in one place rather than in another? Plato himself compares space to a winnowing basket which has holes of different sizes.[16] He attributes to his receptacle fixed positions suitable for the differently shaped elements.[17] Because Platonic space must be both differentiated

[15] "It must be called always the same; for it never departs at all from its own character; since it is always receiving all things, and never in any way whatsoever takes on any character." Plato, *Timaeus*, 50 B.

[16] *Ibid.*, 52 E-53 A.

[17] *Ibid.*, 57 B-58 C; also 63 A-E.

and undifferentiated, Plato is forced to admit that it is "very obscure and difficult to explain." [18]

Aristotle, who has little to say about space, insists that real motion can be explained only in relation to real place, a physical ambient for which a body has an innate preference. There are two essential features to the Aristotelian notion of place. It is first and foremost an environment, "the innermost boundary of what contains." [19] Secondarily, it is motionless, allowing bodies to move from one place to another. From the natural philosopher's point of view the environment is very important in explaining the movement and survival of bodies; the mathematician, abstracting from all qualitative considerations, is much more concerned with the immobility of place and the relations of distance.

Nothing in the universe is isolated and self-sufficient, for all natural phenomena manifest mutual dependencies. Since the first dependency of every body is upon its immediate environment, it must seek a suitable environment in which to thrive. This dependence upon a suitable place is more clearly evident in the higher categories of nature. A human being will adapt the environment to suit his needs or else move elsewhere. Birds fly south for the winter; different flora are found in different climates and conditions must be favorable to foster their growth. An analogous situation must explain the falling of bodies to the earth and stability thereon. It must be admitted that terrestrial stability is a decided advantage to the human body, trees, mountains, and minerals. These natural places, which are conducive to the very well-being of different natures, are environmental conditions toward which bodies necessarily move. In other words, different environments, or natural places must be acknowledged if motion is to be explained at all. Indeed locomotion is inexplicable without natural places toward which

[18] *Ibid.*, 49 A; also 51 B.
[19] *Phys.*, IV, c. 4, 212a20-21.

bodies determinately move.[20] But the important point is that the place toward which a body naturally moves is essentially an environment suitable for the very survival and achievement of various natures.[21] When discussing bodies without consciousness and deliberate effort, we can only say that the active principle of nature automatically and spontaneously moves to that end.[22] To say that different kinds of bodies have different "natural places" is not to say that they have an absolute localization in space. A natural place is essentially a qualitative environment which is congenial to a particular nature and to which that nature spontaneously moves. Should the environment itself move, the body would not remain fixed in a point of space but would accompany or spontaneously seek out the nearest suitable environment.

Once Aristotle has shown that it is place which is the cause of motion, he tries to establish the absolute immobility of place. In this he is really trying to justify the absolute character of Platonic space. Plato had insisted that space is a dimensional framework over and above bodies. Aristotle rejects this because real dimensions must be the quantities of real bodies. But for Aristotle the whole universe is a plenum;[23] that is to say, physical bodies are contiguous to each other throughout the

[20] Cf. St. Thomas, *Sum. cont. Gent.*, III, cc. 22-23; *De pot.*, q. V, a. 5; *In IV Phys.*, 11.

[21] "Videmus enim quod unumquodque horum fertur in suum proprium locum quando non impeditur, grave quidem deorsum, leve autem sursum. Ex quo patet quod locus habet quandam virtutem conservandi locatum: et propter hoc locatum tendit in suum locum desiderio suae conservationis. Non autem ex hoc ostenditur quod locus habeat virtutem attractivam, nisi sicut finis dicitur attrahere." St. Thomas, *In IV Phys.*, 1, n. 7.

[22] "Sic enim forma est principium motus localis, inquantum alicui corpori, secundum suam formam, debetur aliquis locus, in quem movetur ex vi suae formae tendentis in locum illum, quam quia dat generans, dicitur esse motor." St. Thomas, *Sum. cont. Gent.*, III c. 23.

[23] *Phys.*, IV, cc. 7-9; see also J. de Tonquédec, *Questions de Cosmologie et de Physique chez Aristote et saint Thomas*, I. Le système du monde (Paris, 1950), pp. 7-71.

entire universe. Therefore, real dimensionality is established in the contiguity of bodies from the center to the circumference of the universe. Aristotle gives absolute meaning to the common expressions "up" and "down," so that a body which tends to fall "down" is really tending to an absolute center in the universe.[24] Therefore for Aristotle the earth must be immovable and the upward places must be spheres geometrically located around the earth as a center.[25] In other words, Aristotle's conception of determined spheres for the elementary bodies with the earth as an immovable center follows from the absolute immobility which he attributes to place.

But there are two difficulties involved in this part of Aristotle's doctrine: i) the validity of such an absolute localization of positions; ii) the spatialization of place.

While it is very easy to imagine an absolute dimensional framework in which the spheres of the heavens and the position of bodies are geometrically ordered, what actual meaning can such a conception have? When we see a row-boat moving across a lake, we see the relative positions of boat to shore. We say that the boat is not moving if the relative positions remain unchanged. But can we say that even that relative order is absolutely immobile? If we are talking about an order or situs existing in reality, what basis is there for saying that it has absolute immobility? According to what framework is that order the same and immovable? To say that there exists an absolute matrix against which the immobility of positions has absolute physical significance is to assert something without justification. All we can really assert is that the relative positions *quoad nos* are the same and immovable. This is quite different from asserting an absolute immobility to place. When we speak of the universe as a whole, the absolute localization of positions is clearly impossible. Our notions have only

[24] *Phys.*, IV, c. 4; *De Coelo*, I-II; cf. St. Thomas, *In IV Phys.*, 1, n. 7.
[25] *De Coelo*, I, c. 8, 277bl ff.; St. Thomas, *In II de Coelo*, lect. 6, nn. 5-6.

relative value *quoad nos*. This is all we are justified in meaning and this is all we need to mean.[26]

But the more important point is that physical place is not space. It is not to a position in space that natural bodies spontaneously move but to an environment. Heavy bodies do not fall to a point in the universe but to this earth. There is no logical justification for identifying natural place with fixed positions in the universe; in fact this identification is illogical, for we do not know what a fixed position is. Aristotle's cosmology as expounded in his *De Coelo et Mundo* very clearly spatializes natural place and reduces it to a fixed position in the universe. Jean Buridan is more realistic when he rejects this as pure imagination.[27] For him natural place has meaning only relative to a particular environment; thus the natural place of air is to be above water wherever it may be, and it is the nature of solids to fall below irrespective of their position in space.[28] In other words, actual experience shows that various bodies move to determined environments; it does not show that they move to mere positions in space.

The important point is that physical place is essentially a

[26] "Est animadvertendum, quod punctum ad quod locus dicit ordinem et ex quo immobilitatem desumit, necesse est ut et ipsum sit quodammodo fixum et immobile; at huius immobilitas non est pensanda simpliciter et absoluta, ut quidam etiam recentiores scholastici (v. g., Lorenzelli) tenere videntur; sed est solum secundum quid et relativa." A. M. Pirotta, *Summa Philosophiae* (Turin,1936), II, 193, n. 294. Among contemporary scholastics who attribute absolute immobility to place we must mention P. Hoenen, who identifies place with an all-pervading and absolutely fixed *ether*. Cf. *Cosmologia*, 4th ed. (Rome, 1949), pp. 66-68; 460-467.

[27] Buridan, *Quaestiones de Caelo et Mundo*, Lib. IV, q. 7, *ed. cit.*, pp. 266-7.

[28] "Nec valet illa imaginatio quod terra superior subdistracta inferiore terra, moveretur deorsum; quia si terra esset perforata usque ad centrum, non solum esset naturale quod terra proiecta in illud foramen descenderet ad centrum, imo etiam aqua ibi proiecta descenderet usque ad centrum, . . . quia hoc est naturalis inclinatio aquae quod sit sub aere; et aer etiam, ibi praeexistens, ascenderet naturaliter ad finem essendi supra aquam." Buridan, *ibid.*, p. 267, lines 4-20.

suitable environment for a particular nature. When that nature is not in a congenial habitat, it spontaneously moves to the nearest place conducive to its well-being and fulfillment as a physical reality. The natural environment attracts bodies, not as a magnet attracts iron, but as fulfillment attracts the incomplete. That is to say, the influence of natural place upon movement lies in the order of final causality.[29] It is a fact given in human experience that different types of bodies spontaneously and determinately move to different environments. The explanation offered by natural philosophy is merely that particular natures spontaneously and necessarily "aim" at an environment conducive to the perfection and self-enjoyment of the individual nature. What that environment may be and what are the conditions of movement can be determined only by observation and experiment. But this environment has nothing to do with an absolute position in the universe. Our conception of an absolute space endowed with fixed positions arises from the imagination. Moreover, there is nothing about this imaginative space which can account for the movement of bodies in the universe.

ii. Imaginative Space

It is an extraordinary fact that we commonly conceive "space" as a universal framework of dimensionality, independent of the physical bodies we see around us. We are easily led to believe that this space has an objective reality. If real dimensionality, however, is nothing but the real quantity of real bodies, the all-pervading, absolute framework in which we perceive dimensive quantities cannot be an objective reality but is rather, a subjective condition arising from our corporeal nature. This is more clearly evident in our conceptions of geometrical figure in which actual material bodies are disregarded. It is in this space that we imagine lines, circles, and

[29] Cf. St. Thomas, *In IV Phys.*, 1, n. 7.

solids. The whole of Euclidean geometry utilizes this conceptual space as an indispensable screen of thought. We cannot imagine a line except in a framework which already involves the "otherness" of positions. Even the thought of "two" points presupposes a spatial framework endowed with otherness of position. In the last analysis the "curvatures" of non-Euclidean geometry are projected against a background of undifferentiated "absolute" space, for without such a background there would be no non-Euclidean "curvature."

Emmanuel Kant, so struck by this feature of all mathematical and physical thought, concluded that space must be an *a priori* condition of the human mind, a condition which makes experience possible.[30] While it is true that a certain kind of spatial framework is subjective and a condition of knowing dimensive quantities, it does not follow that all dimensionality is purely subjective or that all space is *a priori.* Real dimensions belong to physical bodies; our determination of that quantity depends on our own position and relative condition; but what lies in the nature of the human mind is a natural aptitude for knowing quantity—and this we may call imaginative space.

There are two characteristics of "imaginative space." First of all it is a spatialized receptivity of the human mind, a kind of subjective dimensionality of imagination relative to which we think of variously extended things. The second characteristic is that it is "separated from bodies"; that is to say, it is transcendent to all bodies. It transcends both the concrete body which is quantified and the sensible matter of all bodies, so that it is the framework of even geometrical figures abstracted from every physical body. The first characteristic undoubtedly arises from the fact that human beings themselves are quantified realities in the universe. The human mind utilizes corporeal organs which are predisposed to knowing reality in its spatial and

[30] Kant, *Kritik der reinen Vernunft,* Bk. 1, P. 1, sect. 1; cf. also *Prolegomena,* § 6-20.

temporal conditions.[31] The second characteristic arises from the nature of the human intellect, which can disregard matter, physical bodies, movement, and causality in a consideration of pure quantity. In other words, it is the abstractive character of an intellect radicated in a quantified, sentient body which conceives an all-pervading, homogeneous "space" separated from physical bodies.[32] It is this space which Plato objectivized, and it is this space which Kant canonized. The point is that we must acknowledge a certain subjective condition of the human mind, a universal spatializing condition, which makes geometry and even human experience of physical reality possible. But it is clear that this spatializing condition is not to be confused with real dimensions. Furthermore even if such an absolute space were to exist, it is clear that no undifferentiated space could account for the movement of bodies to one place rather than to another. It is only a physical environment, a qualitative circumstance, which can attract a nature spontaneously aiming at its proper self-enjoyment.

iii. Strictly Mathematical Space

By a strictly mathematical space is meant the geometrical description of a phenomenon in reference to determined coordinates. Until the late nineteenth century Euclidean geometry was thought to be sufficient to describe all natural phenomena; and, indeed, it was generally accepted as the only geometry.[33] Coordinates chosen in astronomy were thought to have an

[31] St. Thomas, *In Boeth. de Trin.*, VI, 1-2; cf. *In II de Anima*, 5, nn. 283-285, lect. 12-13; see also *In III de Anima*, 8.

[32] A complete analysis of the psychological predispositions for knowing "space" has not yet been made, as far as we know. Partial attempts have been made by Poincaré, *Science and Hypothesis, ed. cit.*, pp. 51-88, and by H. Weyl, *Philosophy of Mathematics and Natural Science* (Princeton, 1949), pp. 95-137.

[33] On the history of non-Euclidean geometries, cf. A. Whitehead, *Essays in Science and Philosophy, ed. cit.*, pp. 177-226.

absolute value so that all movements could be described adequately in relation to them. Euclidean geometry so used was an identification of imaginative with purely mathematical space. While it is true that all geometry is ultimately projected against the background of imaginative space, it would be an error to identify them. In practical mathematics the principal aim is to determine positions by measurements and to describe them in equations valid in some coordinate system. As soon as it is a question of measurement, then more than imaginative space is involved. What is actually involved is a space constructed in accord with our measurements. This space is utilized in what Einstein calls " practical geometry "; and " its affirmations rest essentially on induction from experience, but not on logical inferences only." [34]

All measurements are made relative to fixed frames of reference, or at least to frames which can be assumed as fixed. In classical mechanics all inertial systems constructed with Galilean coordinates were simply transformable one into the other. An inertial system, as has been shown in the last chapter, presupposes an absolute space in which the Newtonian principle of inertia has meaning. It was thought that the propagation of light waves through interstellar space demanded a substantial carrier of some kind—an " ether absolutely at rest." But all experimental attempts, for example, those of A. A. Michelson and E. W. Morley, to measure the absolute motion of the earth with respect to the ether had failed. The failure to determine an absolute space led to a critical examination of the meaning of space and time in mathematics. This work, begun by Henri Poincaré, H. A. Lorentz, G. F. Fitzgerald and others, was synthesized in 1905 by Albert Einstein in his restricted theory

[34] Einstein, " Geometry and Experience," an address given to the Prussian Academy of Sciences in Berlin, Jan. 27, 1921, in *Sidelights on Relativity* (London, 1922), p. 32.

of relativity, which emphasized the special character of mathematical space as distinct from imaginative space.

The peculiar characteristic of mathematical space is that it is constructed from our measures. Mathematical measurements depend upon the position and condition of the observer; since the mathematician himself is situated in a particular place in the universe and makes his measurements at a particular time, his measurements are necessarily relative to himself as a physical "event." Classical mechanics, which assumed an absolute space or ether to justify inertial motions, thought that a mathematical description of an event for one observer would serve equally for another observer through a process of simple transformation. This is to say, the straight line PQ for observer A would be described in co-ordinate system x, y, z, t; and the same straight line would be described for observer B, moving uniformly along the x axis, in co-ordinate system x', y', z', t'. Thus the description for the square of the line element PQ remains invariant for both systems as $(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2$, *or* $dx^2 + dy^2 + dz^2$. But this assumes that each observer ascribes the same values to the other's lengths and times as to his own, a thesis which cannot be supported unless there be an absolute space which can be determined. The special theory of relativity rejects absolute motion, that is, the possibility of measuring motion in relation to absolute space. Following Lorentz, Einstein insists that all measurements of space and time are strictly relative to the observer. Assuming that the velocity of light is constant for any given observer, he shows that no observer can detect his own movement, but another observer moving uniformly and rectilinearly with respect to it would detect a slight "contraction" of A's length in the direction of motion. Thus while A cannot detect any contraction of his own measuring rods, B can; and conversely. Therefore, Einstein concludes, a simple transformation cannot be made between A's system and B's, but account must be taken of the relative difference in measurement. The

equivalence of these two systems is accomplished by a new transformation, known as the Lorentz transformation, in which

$$x' = \frac{x - ut}{\sqrt{1 - \frac{u^2}{c^2}}}, \; y' = y, \; z' = z, \; t' = \frac{t - \frac{u}{c^2}x}{\sqrt{1 - \frac{u^2}{c^2}}}$$

where $c =$ the velocity of light *in vacuo*. According to this transformation the interval between P and Q, observed by two observers moving in uniform rectilinear motion, remains invariant in the description $dx^2 + dy^2 + dz^2 - c^2dt^2$, since the discrepancy of the two observers is rectified in the subtractive term. By means of the constant velocity of light for any given observer Einstein explained the Fitzgerald "contraction" and the Lorentz transformation, both of which were offered to explain the failure of the Michelson-Morley experiment to determine the absolute velocity of the earth relative to a stationary ether.

The equivalence of these two systems by means of the Lorentz transformation is really a unification of two different co-ordinate systems, as Minkowski later showed. The result is a kind of "curvature," which merely means that the relations between the mutual distances of the points are different from the relations which obtain in Euclidean geometry. As Sir Edmund Whittaker points out,

> Curvature (in the mathematical sense) has nothing to do with the *shape* of the space—whether it is bent or not—but is defined solely by the metric, that is to say, the way in which "distance" is defined. It is not the space that is curved, but the geometry of the space.[35]

Furthermore the event PQ which is described in either inertial system is itself a curvature. That is to say, time is not considered as an independent co-ordinate, but as an element intrinsically affecting the measurement of space itself. Thus in the

[35] E. Whittaker, *From Euclid to Eddington, ed. cit.*, p. 40.

description of relativity it is not the *distance* between points P and Q which is specified, but the *interval* between two events emerging in time. In the four-dimensional continuum of space-time every event is described as emergent in time; when this emergence is designated by co-ordinates, the matrix is a set of Gaussian curves. Thus in the extended theory of 1916 Einstein presented the exact formulation of the general principle of relativity as "All Gaussian co-ordinate systems are essentially equivalent for the formulation of the general laws of nature." [36]

The important point to notice is that geometric space is constructed from measurements. It is not a question of the real space of the universe, but of the geometric space which must be used by us to describe measurents accurately. When dealing with velocities considerably less than that of light, the discrepancy of systems is not sufficiently great to give a "curvature" to geometric space. The essential point is that geometric space is not identical with imaginative space; rather it is constructed either from axioms in "axiomatic geometry," or from measurements in "practical geometry." [37] But it is clear from what has been said that all systems of geometry are projected against the background of homogeneous imaginative space.

It is evident, then, that neither imaginative nor mathematical space, strictly so-called, constitute the space of the universe, for real space is the objective dimensionality of a body or of the sum total of all bodies. But we have no means of determining the real nature of universal space, for all our statements about it are relative to our own position within the universe. Hence our statements about the "immobility" of real space have no absolute meaning. Furthermore even assuming that an absolute immobility could be ascribed to space, this space would have no value in explaining the movement of bodies to one place

[36] Einstein, *The Theory of Relativity* (London, 1924), p. 97.

[37] Cf. Einstein, "Geometry and Experience," in *Sidelights on Relativity*, pp. 27-56.

rather than to another. An undifferentiated "space" cannot account for the difference of movement. It is place rather than space which yields an explanation of locomotion. Physical place, being a qualitative environment, can account for the spontaneous movement of a body to one place rather than to another, for it is within the intentionality of natures to seek a suitable environment in which to thrive and to reach fulfillment. While it is true that place must manifest a certain "immobility," there is no need to think of it as absolute. All that is evident in experience is the relative immobility of natural place; and this is all that is required to explain the movements given in human experience.

The difference between space and natural place has been pointed out in order to show that it is to place as such that natural bodies move. Nature as an active principle is a source of spontaneous movement, of movement which aims at some realization of fulfillment for the being itself. The first requisite for natural bodies is that they be in a suitable habitat; thus if they are not, nature necessarily moves toward an environment conducive to conservation and "self-enjoyment." It is on this basis of natural spontaneity and the final causality of place that the Aristotelian and Thomistic tradition explains gravitation. However, the more popular explanation of gravitation is the mechanical theory of attraction.

II. Newtonian Attraction

A gravitational theory of mechanical attraction is a very simple explanation of the phenomenon of falling bodies. It is very satisfying to the imagination, especially to an imagination which has grown accustomed to accept mechanical explanation. For more than two hundred years students of physics have been taught that bodies fall to the earth because of the gravitational "pull" of the earth; they have been taught to believe that the

planets are retained in their orbits because of inertia and the mutual attractions of masses scattered throughout the universe. While this explanation is very satisfying to the imagination, it leaves much to be desired intellectually and experimentally.

Of course, in the present context " attraction " is used in the sense of an efficient cause. Scholastic philosophy also used the term to signify the causality exerted by a desirable good, as when a boy is attracted by candy and cakes. But in the order of final causality the good is said to " draw " or to " attract " only in a metaphorical sense.[38] In the present discussion the term attraction is meant to signify efficient causality, a pulling force, which draws other bodies as a horse pulls a cart.

i. Historical Background

Aristotle and St. Thomas considered briefly the possibility of a mechanical explanation of gravitation, both attraction of bodies by the earth and a forcing down of bodies by a whirling force.[39] But an explanation of gravitation by external forces of either the pushing or pulling kind would destroy the whole concept of nature as an intrinsic principle of the body's own movement, for " nature " is not a power of moving other bodies but a spontaneous source of a body's own proper movement. Furthermore, Aristotle argued that one or the other mechanical explanation could not account for the evident accelerated movement of light bodies upward and heavy bodies downward; each explanation might conceivably explain one type of acceleration, but could not explain both together.

Already in the thirteenth century, however, there were some

[38] " Attractio autem non est propria motio, quia motio non est transitus aliquis, illa autem attractio solum est convenientia et sympathia unius ad alterum, ut trahatur ab illo, quod non nisi translative dicitur motio." Joannis a S. Thoma, *Curs. Phil., Phil. Nat.*, I. P., Q.XIII, a. 11, *ed cit.*, XI, 276b.

[39] Arist., *De Coelo*, 1, c. 8, 277b 1-8; St. Thomas, *In I de Coelo*, 18, nn. 1-4; also *In II de Coelo*, 23, n. 4.

who attributed more than mere final causality to the natural place of bodies. St. Bonaventure believed that over and above spontaneity and the final causality of place one had to attribute an attracting force to natural place and an expelling force to unnatural place.[40] Roger Bacon developed a rather complete "field" theory to account for gravitation. He maintained that besides the generator of bodies and the final causality of place, all bodies and the whole medium are permeated by an immaterial power derived from the heavenly bodies. Neither the natural form of bodies nor the suitability of place, he thought, are sufficient to account for movement; there is needed a *virtus immaterialis,* which fills all space and is concentrated more intensely in the natural place.[41] For Bacon the natural place of a body exercises not only final causality but efficient causality as well.[42] Thus in Bacon's view gravity and levity are diffused immaterial forces which, although derived from the heavenly bodies, are concentrated in various natural places.[43]

[40] "Dicendum quod ad motum gravis non sufficit solummodo gravitas sive qualitas propria, immo concurrit virtus loci attrahentis et virtus loci expellentis et virtus corporis quanti, praeter illa dua moventia, quae ponit Philosophus, scil. generans grave et leve, et removens prohibens." *In II Sent.* 14, p. 1, a. 3, q. 2; also Richard of Mediavilla, *In II Sent.* 14, a. 2, q. 4 (Brescia, 1591).

[41] ". . . movetur a principio intrinseco, scil. a forma immateriali, quae non est actus ipsius materiae gravis, unde non movetur a forma materiali, quae est actus suae materiae, quia illa forma non est aliquid praeter hoc, quod sit actus materiae, immo est purus actus materiae, et nulla talis forma sufficit ad hoc, quod aliquid de se movetur; sed movetur a forma immateriali quam participat, quae non est actus materiae ipsius, sed virtus ipsa caelestis minus complete ab ipso gravi participata, a loco autem deorsum magis complete." *Questiones supra libros 8 Physicorum, Lib. VIII, Opera hactenus inedita,* fasc. XIII (Oxford, 1935), pp. 398-9; cf. pp. 396-410; also *Quaestiones supra libros 4 Physicorum ibid.,* fac. VIII (Oxford, 1928), p. 173 ff.; *Communia Naturalium,* I p. III, d. 2, c. 3; *ibid.,* fasc. III (Oxford, 1911), pp. 204-5.

[42] "finis non movet secundum veritatem, sed metaphorice." However, "locus est causa motus in genere finis et etiam efficientis excitantis." *Ibid.,* fac. XIII, p. 409.

[43] "Dicendum quod gravitas et levitas non solum attenduntur a parte mobilis, sed etiam a parte medii, quia quantum attendit magis ad inferiorem

At least as early as the fourteenth century some conceived place as a total efficient cause of gravitation. Buridan mentions this opinion of *aliqui* who say that "*locus est causa movens ipsum grave permodum attractionis, sicut magnes attrahit ferrum.*" [44] He attacks this opinion as contrary to experience, "because if iron is near a magnet, it immediately starts moving more quickly than if it were farther removed; but this is not the case of heavy bodies with regard to their natural place." [45]

The revival of Platonism in the fifteenth and sixteenth centuries popularized the theory that all similar bodies tend to congregate. Copernicus himself proposed this explanation to account for the rotundity of bodies and spheres, as well as for gravitation.[46] This Platonic and Pythagorean theory of gravitation was generally employed by Copernicans who rejected the absolute space of Aristotle.[47]

However at this time many experiments were performed with the magnet. In 1600 Sir William Gilbert of Colchester (1546-1603), personal physician to Queen Elizabeth, published his influential work *De Magnete,* in which he suggests that gravitation is nothing but the attraction of the great magnet, the Earth.[48] The Englishman, Nicholas Hill, whose *Philosophia Epicurea* appeared in 1601, equated magnetic attraction and

partem medii, tanto magis acquirit de illa forma diffusa a centro ad circumferentiam per medium, quae continuat partes mobilis et est virtus immaterialis, qua unumquodque fertur ad locum." *Communia Naturalium, loc. cit.* This Pseudo-Grossetete and John Baconthorp also follow this teaching of Roger Bacon. Cf. A. Maier, *An der Grenze, ed. cit.*, pp. 181-2.

[44] Buridan, *Quaestiones de Caelo*, II, q. 12, *ed. cit.*, p. 177; cf. p. 179 and IV, q. 2, pp. 248-50.

[45] *Ibid.*, 11, q. 12, p. 179, lines 5-7: "quia si ferrum sit propinquius magneti, statim incipiet velocius moveri quam si esset remotius; sed non est ita de gravi respectu sui loci naturalis."

[46] Copernici, *De Revolutione Orbium Caelestium*, lib. 1, cap. 9 (Thorn, 1873), pp. 24-25.

[47] Cf. A. Maier, *An der Grenze, ed. cit.*, pp. 170-173.

[48] W. Gilbert, *On the Magnet, magnetic bodies also, and on the great magnet the earth* (London, 1900), cf. especially I, c. 17, pp. 41-43; VI, c. 4-5, pp. 225-230.

gravitational pull; in proposition 206 he said that "the inclination of things to the earth is nothing other than magnetic attraction (*adhaerentia*)," and he maintained that this attraction is exerted reciprocally.[49] The revival of Epicurean atomism by Marke Ridley, Sebastian Basso, Daniel Sennert, and Magnen strongly fostered an attractional theory of gravitation similar to magnet attraction.[50] Pierre Gassendi (1592-1642) enunciated the prevailing atomist theory of gravitation in his popular *Animadversiones in Decimum Librum Diogenis Laertii*: "Gravitas non tam videatur qualitas ipsis gravibus inexsistens, quam vis impressa ex attractione magnetice facta ab ipsa Tellure." [51] He insisted that gravity is not a property of bodies, but rather a force externally impressed upon them by the earth.[52]

However much Descartes favored a mechanical explanation of motion he could not accept the theory of magnetic attraction, for this attraction was explained by the emission of very small and subtle particles which acted like fish hooks pulling bodies to the magnet.[53] Since every extension must be infinitely divisible, Descartes denied the possibility of atomism. Descartes rejected every theory of gravitation which made gravity an innate tendency of bodies, or which explained it by the attraction of the earth.[54] To him the prevailing opinion of "attraction," "sympathy," and "antipathy" employed occult forces which

[49] Cf. G. McColley, "Nicholas Hill and the Philosophia Epicurea," in *Annals of Science*, IV (1939), 390-405. Quotation cited from p. 396, note 46; cf. also prop. 438, cited on p. 397, note 51.

[50] Cf. M. Boas, "The Establishment of the Mechanical Philosophy," in *Osiris*, X (1952), 412-541.

[51] Gassendi, *Animadversiones*, 3rd ed. (Lyons, 1675), I, 167a. See also his *Philosophiae Epicuri Syntagma* (Lyons, 1675), II, 380b-384a.

[52] *Animadversiones, ed. cit.*, 245a; cf. 243b-255b.

[53] Cf. Gassendi, *ibid.*, I, 245b ff.

[54] "Je ne croy point non plus que les corps pesans descedent par quelque *qualité réelle*, nommée pesanteur, telle que les philosophes l'imaginent, ny aussi par quelque attraction de la terre." Letter LXI, Automne 1635, *Oeuvres* I, 324.

were not conformable to strictly mechanical laws.[55] Descartes' friend, Isaac Beeckman, suggested a possible solution in his *Journal* of 1604-1634. He maintained that throughout the entire universe there is an "ether or subtle matter which is always in motion"; this, he said, accounts for the gravity of bodies.[56] Descartes constructed an elaborate theory of movement by means of this subtle revolving matter, which he called vortices. The ether which permeates the entire universe constitutes a perpetual whirlpool with various centers of revolution.[57] Bodies, themselves devoid of motion, are impelled by the force of the vortex, so that heavier bodies are forced to the center, while lighter bodies are carried to the circumference. Thus gravity is nothing but the impact of vortex motion forcing heavy bodies to the earth.[58] Descartes took issue with Galileo for assuming gravity to be innate in bodies and for saying nothing about its nature.[59]

[55] Cf. *Principia Philosophiae*, IV, pp. 184-7.

[56] Beeckman, *Journal*, I, 25-26 (1613-14); 381-2 (1626-7); cf. M. Boas, *art. cit.*, p. 434 ff. For a good study of Descartes' indebtedness to Beeckman, cf. Mouy, *La développement de la physique Cartésienne* (Paris, 1934).

[57] Cf. *Prin. Phil.*, P. III, *ed. cit.*, pp. 80-202. Compare this with the early Atomist doctrine presented by Aristotle (*De Coelo*, I, c. 8, 277b 1-8) and Theophrastus (Diels, *Doxog.*, pp. 142-3).

[58] Cf. *Prin. Philo.*, P. IV, art. 20-27. The French translation (1647) undertaken by Abbe Claude Picot expresses Descartes' view very clearly: "Toute la pesanteur de ce corps consiste en ce que le reste de la matière subtile qui est en cette portion d'air, a plus de, force à s'éloigner du centre de la Terre, que le reste de la matiere terrestre qui le compose." *Prin.*, P. IV, art. 24, *Oeuvres*, IX, p. 212. In his letter to Claude Picot Descartes says, "I have known none of them (Aristotle, Plato and the Schools) who did not presuppose weight in terrestrial bodies, but although experiment proves to us very clearly that the bodies we call weighty descend toward the centre of the earth, we do not for all that know the nature of what is called gravity, that is, the reason or principle which causes bodies to descend thus, and we must derive it from elsewhere." English trans. by Haldane and Ross, *The Philosophical Works of Descartes*, I, 207 (Cambridge, 1911).

[59] Letter XCI to Mersenne, Epistolae, Amstelodami 1714, t. II, pp. 276-287. Descartes goes so far as to say about Galileo, "in eius libris nihil

Descartes' philosophy became very popular in France through the efforts of Mersenne, Arnauld, and Rohault.[60] Jacques Rohault's *Traité de Physique* became a very widely used textbook for students of physics.[61] Cartesian mechanics was introduced at the University of Cambridge even after the time of Newton.[62] It is interesting to note that the Cartesian system became known as "mechanical" philosophy.

The supporters of an attractional, or "non-mechanical" theory of gravitation strongly opposed the Cartesian system of vortices. However, little advance was made until Newton published his *Principia Mathematica* in 1687 in which he commonly employed the term *attractio* in explaining universal gravitation. Although Newton carefully avoided any explanation of the "cause of gravity," his use of the term *attraction* immediately suggested the idea of a force similar to magnetism; and readers of the first edition inevitably took it as a defense of the prevailing attractional theory.[63] For this reason Leibniz strongly attacked Newtonian attraction as "a senseless occult quality, which is so very occult that it can never be cleared up, even though a Spirit, not to say God Himself, were endeavoring to explain it."[64] The popularity of the *Principia* in England was

video, quod ipsi invideam, aut fere nihil, quod promeo vellem agnoscere." *Ibid.*, p. 281.

[60] Cf. P. Boutroux, "L'enseignement de la mécanique en France au XVII[e] siècle," in *Isis* IV (1922), 276-294.

[61] Cf. G. Sarton, "The Study of Early Scientific Textbooks," in *Isis*, XXXVIII (1947-8), 137-148.

[62] Cf. Cajori's notes in his edition of the *Principia* (Berkeley, 1947), pp. 629-632.

[63] Readers of the first edition had justification for assuming that Newton intended to support the attractional theory. Newton's phrases suggest it. He says (Book 1, Prop. LX): "If two bodies . . . attracting each other with forces inversely proportional to the square of their distance"; (Book I, Prop. LXIX) "the absolute forces of the attracting bodies"; (Book I, Prop. LXXII) "the attraction of one corpuscle towards the several particles of one sphere"; (Book I, Prop. LXXV) "the attraction of every particle is inversely as the square of its distance from the centre of the attracting sphere," etc.

[64] Leibniz letter to Hartsoeker, Feb. 10, 1711, in *Phil. Schriften*, ed.

largely due to Newton's followers, Roger Cotes, Samuel Clarke, Richard Bentley, and others, rather than to any effort on Newton's part. These followers defended Newtonian physics as a refutation of "mechanical philosophy." In the famous preface to the second edition of the *Principia* (1713), Cotes refutes the Cartesian system of vortices and defends the mutual attraction of bodies throughout space, since the ultimate explanation of gravitation cannot be "mechanical."[65] Samuel Clarke, considered to have been the leading English metaphysician of his day, defended Newtonian philosophy for his bachelor's degree at Cambridge (Caius) in 1695. Two years later he made a new Latin translation of Rohault's *Traité de Physique* to which he appended Newtonian notes which virtually amounted to a refutation of the Cartesian text; gravitation is explained as attraction at a distance as against the pushing of bodies by vortices. The Rohault-Clarke treatise became the outstanding scientific textbook in England and America, so that many generations of English and American students (at Yale until 1743) learned Newtonianism in a Cartesian textbook.[66] Voltaire popularized Newtonianism in France through his *Éléments de la Philosophie de Newton* (1738); this popular and witty treatise inspired many of the *Encyclopédie* (1751-1780) and did much to overthrow the Cartesian theory in France.[67]

Gerhardt (Berlin, 1887), III, 519; see also his "Antibarbarus physicus pro philosophia reali contra renovationes qualitatum scholasticarum et intelligentiarum chimaericarum," *Phil. Schriften*, VII, pp. 337 ff: Although Christian Huygens accepted the law of the inverse square, he rejected what he supposed to be Newton's theory of attraction and continued his adhesion to the tenet of Descartes, cf. Discourse de la cause de la pesanteur in his *Traité de la lumière* (Leyden, 1690), pp. 125-180.

[65] Newton's *Principia*, ed. Cajori, xx-xxxiii; cf. Cajori's notes, pp. 632-637.

[66] Cf. G. Sarton, "The Study of Early Scientific Textbooks," in *Isis*, XXXVIII (1947-8), 137-148.

[67] Cf. H. Butterfield, *op. cit.*, pp. 124-158. Voltaire was refused a license to print his book in France by the Chancellor, Henri d' Agriesseau, a Cartesian. Writing to his old friend, Thiriot, Voltaire says, "Perhaps I

Thus the Newtonian theory of " attraction " was promulgated by men, many of them religiously inclined, who wished to overthrow the Cartesian system, considered by many as " atheistic," and to replace it with a " non-mechanical " philosophy. When Newtonian philosophy gained ground in Europe, it was the opinion of his admirers rather than that of Newton himself which became prevalent. Newton's personal opinion was very different from any magnetic-like attraction which caused bodies to fall to the ground. It is almost ironical that the popular theory should have become known as " Newtonian attraction."

ii. Newton's Personal Explanation

Newton was very reticent about expressing his views on the cause of gravitation. He insisted that his *Principia* was designed " only to give a mathematical notion of those forces, without considering their physical causes and seats." [68] In the general scholium to his great work he plainly states,

> Hitherto I have not been able to discover the cause of those properties of gravity from phenomena, and I frame no hypotheses; for whatever is not deduced from the phenomena is to be called an hypothesis; and hypotheses, whether metaphysical or physical, whether of occult qualities or mechanical, have no place in experimental philosophy.[69]

Newton was induced to take this stand in order to avoid becoming involved in disagreeable controversies, which he always detested.[70] He maintained that his mathematical principles are

should be obliged to him. I dealt with the philosophy of Descartes as Descartes dealt with that of Aristotle . . . I would have gained nothing but new enemies." (quoted by Sarton, *art. cit.*, p. 145). The work was first printed in Amsterdam in 1838.

[68] *Principia*, Def. VIII, ed. Cajori, p. 5; also Bk. I, sect. xi (p. 164); Scholium to sect. xi (p. 192); *System of the World*, n. 2, p. 550; *Optics*, Bk. II and III.

[69] Ed. Cajori, p. 547.

[70] Cf. Cajori's analysis of the famous phrase, *ibid.*, note 55, pp. 671-676; also Snow, *Matter and Gravity in Newton's Physical Philosophy* (London, 1926).

based upon observable phenomena and are not the result of metaphysical speculation, such as was the system of Descartes. Indeed he insisted that his laws of gravitation are independent of any philosophical hypotheses.

> What I call attraction may be performed by impulse, or by some other means unknown to me. I use that word here to signify only in general any force by which bodies tend towards one other, whatsoever be the cause.[71]

Although Newton refrained from declaring clearly the cause of gravitation for lack of experimental evidence, he pursued such an investigation throughout his whole life. About eight years before the publication of the *Principia* Newton wrote some of his suspicions to Robert Boyle, since he was asked to do so.[72] In this youthful period Newton believed that forces such as cohesion, repulsion, fermentation, and gravity might be explained by "an aethereal substance, capable of contraction and dilatation, strongly elastic, and, in a word, much like air in all respects, but far more subtile."[73] This "aethereal substance" is, in fact, similar to Boyle's own use of *effluvium,* or "etherical spirit" as an attracting or repelling force emitted by bodies.[74] The *effluvium,* which was commonly discussed by Gilbert, Gassendi, Boyle, and other adherents of the "corpuscular philosophy," was never clearly defined but was generally conceived as a subtle material substance, either as an elastic ether or as subtle emanations.

In later years Newton seems to have thought of gravity as due to a more immaterial cause. He certainly did not think of

[71] Newton, *Optics,* 3rd ed. (London, 1721), Q. 31, p. 351.

[72] Letter to Boyle, Feb. 28, 1678/9, first printed in *Life of Robert Boyle* by Thomas Birch, *Works of Robert Boyle* (London, 1744), I, 70-73.

[73] *Ibid.*, p. 70.

[74] Cf. Boyle, "Of the Strange Subtility of Effluviums," *Works,* pp. 38-42; 52-3; "Of the Great Efficacy of Effluviums," pp. 18-19, 32-33; "Of the Determinate Nature of Effluviums," pp. 21, 57; "The General History of the Air," p. 641.

gravity as a force inherent in bodies which attracted other masses at a distance. In a letter to Bentley, who was then preparing a course of sermons against atheism,[75] Newton wrote:

> You sometimes speak of gravity as essential and inherent to matter. Pray, do not ascribe that notion to me; for the cause of gravity is what I do not pretend to know, and therefore would take more time to consider it.[76]

In another letter he says:

> That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance through a vacuum, without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity, that I believe no man, who has in philosophical matters a competent faculty of thinking, can ever fall into it. *Gravity must be caused by an agent acting constantly according to certain laws; but whether this agent be material or immaterial,* I have left to the consideration of my readers.[77]

It is interesting to note that even at this time, Newton allowed for the possibility of an *immaterial* agent to account for gravitation.

In the general scholium added to the second edition of the *Principia* (1713) Newton devotes considerable space to showing the immediate dependence of the universe upon Divine Providence. All things and all motions fall under the "dominion" of God Who is eternal and everywhere present. "He endures forever, and is everywhere present; and by existing always and everywhere, *he constitutes duration and space.*"[78] Absolute space is not God,[79] but it is the "sensorium of God." In the

[75] Brewster, *Life of Sir Isaac Newton* (London, n. d.), pp. 256-261.

[76] Letter to Bentley, 1692/3, in Edleston, *Correspondence of Sir Isaac Newton and Professor Cotes* (London, 1850), p. 159.

[77] *Ibid.* (emphasis mine). Note also *Principia*, Bk. I, Prop. LXIX, scholium: "whether corporeal or incorporeal," *ed. cit.*, p. 192.

[78] *Principia*, ed. Cajori, p. 545 (emphasis mine).

[79] *Ibid.*; and *Optics* (London, 1721), Q. 28.

thirty-first query, which he appended to the second edition of the *Optics* (1717), Newton insisted that "Particles have not only a *Vis inertiae,* accompanied with such passive Laws of Motion as naturally result from that Force, but also that they are moved by certain active Principles, such as that of Gravity." [80] In other words, Newton conceives bodies to be purely passive, incapable of accounting for their motion or the motion of other bodies. Therefore, some active principle is necessary for putting bodies into motion and for conserving motion already existing.[81]

A further knowledge of Newton's notion of universal principles of motion may be gained from a consideration of his forerunners in philosophy, principally Jacob Boehme and Henry More. Brewster records that Newton was a constant reader and admirer of Boehme, copying many a page from this famous Protestant mystic.[82] Boehme (1575-1624) tried to solve the problem of man's union with God. Since man is a finite being and God, infinite and removed in His heaven, how could man have experience of Him? Boehme answered that God is not removed from this universe but actually constitutes the "soul of nature." Man finds God within himself, for man is a part of the whole of nature and the drama enacted within his own soul merely reflects the drama of the divine essence in the universe.[83]

Henry More, who reintroduced Platonism into Cambridge and directed attention to Boehme, directly influenced Newton's mystical philosophy.[84] For More the whole universe is permeated by spirit, the "immaterial cause" of all motion, co-

[80] *Optics,* Q. 31, *ed. cit.,* p. 397.

[81] Cf. Boas, *art. cit.,* pp. 483-520.

[82] Brewster, *Memoirs of Sir Isaac Newton,* 2nd. ed. (Edinburgh, 1860), II, 371.

[83] Boehme, *Morgenröte im Aufgang,* 1612; *Drei Prinzipien göttlichen Wesens.* Cf. A. Koyré, *La Philosophie de J. Boehme* (Paris, 1929).

[84] Cf. Snow, *op. cit.,* p. 192 ff.

hesion, attraction and repulsion. This spirit is not God Himself; but it is the *anima mundi.*[85] The spiritual substance, which penetrates matter and is the true cause of motion, More identifies with *space,* which he calls the "extension of God, His ubiquity, and His sensorium." Following Boehme, More insists that space is a spiritual and divine reality, representing to us the divine essence. Prof. Snow says,

> It is in the law of gravitation through the action at a distance which is a mathematical expression of an empirical fact—which is not by material impact nor action through a material medium—that Newton found a mathematical and empirical confirmation of More's Neo-Platonic philosophy.[86]

Therefore for Newton this gravitational action is not "mechanical," that is, it is not produced by Cartesian impact or material effluvia, but is the action of God operating through space, His "senorium." Like More, Newton attacked the "atheism" of Descartes' doctrine and insisted that although bodies move *as though* based upon mechanical laws, the ultimate cause of movement cannot be mechanical.[87] Referring to the *Principia,* Newton said in a letter to Richard Bentley (Dec. 10, 1692/3),

> When I wrote my treatise about our system, I had an eye on such principles as might work with considering men for the belief of a Deity; and nothing can rejoice me more than to find it useful for that purpose.[88]

Concluding his study on Newton's personal philosophy, Prof. Snow says,

> The action, as it is described in the law of gravitation, is *direct* and *immediate* in the form of immaterial etheral emanations of spiritual forces through absolute space as its medium, which space is in itself

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[85] More, *Immortality of the Soul,* preface; cf. also *Enchiridion Metaphysicum,* chap. 28.

[86] Snow, *op. cit.,* p. 203.

[87] Newton, *Principi,* General Scholium, *ed. cit.,* p. 546.

[88] Quoted by Cajori, *Principia,* n. 52, p. 669.

an immaterial "sensorium of God" . . . God becomes the "Soul of the World," being immediately substantially present everywhere—although Newton tried to guard himself against Pantheism.[89]

For Newton, then, gravitation is not to be explained by magnetic-like forces inherent in bodies which "attract," but by the direct action of God operating through space. Although the laws of gravitation may be expressed as though bodies mutually attract one another in the inverse proportion of their distance, the cause of gravity, Newton held, cannot be attraction. The theory, therefore, which has been promulgated as Newtonian attraction does not represent the personal philosophy of Newton but of his successors who seized it to combat the "atheism" of Cartesian philosophy or who accepted the *prima facie* meaning of the *Principia.*

iii. Evaluation of Newtonian Attraction

As late as the nineteenth century the theory of gravitational attraction was defended as a "non-mechanical philosophy"; inexplicable forces which attract bodies at a distance were thought to be more conducive to theism and religion.[90] It is clear, however, that from an Aristotelian point of view both Cartesian impulsion and Newtonian attraction are mechanical explanations of gravitation. Whether the action be exerted at a distance or through a material medium does not affect the question. The immediate point concerns the agency responsible for a body's movement. In Newtonian attraction two bodies are said to attract each other mutually, but the actual movement of any one of them is *due* to the "attraction" of the other. Thus A's motion is due to B's pull, and B's motion is due to A's pull;

[89] Snow, *op. cit.*, pp. 208-9.

[90] E.g., Andrea de Guevara y Basoazabal, *Institutionum Elementarium Philosophiae* (Valentia, 1825), III, 154-5. This work was the common textbook in Spanish seminaries during the first half of the 19th century; cf. Spanish *Encyclopedia* (Barcelona, 1925), XXVII, 207a.

the pull of the earth is said to account for the motion of falling bodies. Aristotelian philosophy considers any universal theory which endeavors to explain all motion by an external agency mechanical in the strict sense of the term. Aristotelianism acknowledges a natural spontaneity within bodies to account for their own movement relative to the environment; mechanics in the strict sense of the term refers all motion to an external agency. Thus the first point to be made is that Newtonian attraction, as it is commonly understood, is really a mechanical explanation of gravitation.

Furthermore, Newtonian attraction has never been proved; that is to say, it has never been proved that bodies fall to the earth because of "attraction" or that planets are retained in their orbits because of solar attraction. The very fact that Newton himself did not believe in a force of this kind clearly indicates that he did not *prove* the existence of such a force. Obviously if Newton did not believe that gravitation could be explained philosophically by the "mutual attraction" of bodies according to the law of the inverse square of the distance, he did not prove that bodies fall because of the earth's "attraction." All Newton wanted to show was that if such an attraction be assumed, then a universal law of gravitation could be formulated to describe all known motions. This is merely a convenient hypothesis upon which to formulate mathematical laws. The validity of a mathematical law should not be confused with the question of physical proof. While it is true that the Newtonian equations are generally adequate in describing celestial motions with considerable accuracy, this in itself does not constitute a proof of physical attraction between bodies. The Newtonian equations which are now used in ordinary astronomy and in engineering would have the same mathematical validity regardless of the physical cause of motion. The tendency of bodies toward the earth would conform to these equations whether the

bodies were i) attracted by the earth, ii) endowed with an innate tendency toward an environment, or iii) moved by immaterial forces in space. In other words, as far as the equations are concerned, it makes no difference whether the bodies are mutually "pulled" or not. Therefore, the validity of the equations does not prove the physical cause of gravitation. The important point is that Newton himself did not prove the existence of gravitational attraction within masses; that Newton did not believe in such an explanation manifests this clearly. Furthermore, the validity of Newtonian equations does not imply the truth of such an explanation, for the equations would have the same validity regardless of the actual cause of gravity. Newton himself makes this evident when he says, "What I call attraction may be performed by impulse or by some other means unknown to me." [91]

Emmanuel Kant was fully aware of the fact that Newtonian attraction was not empirically demonstrated.[92] For him it was more important to justify what he considered to be a universal and necessary *law* of physics. This he did by reducing the law of Newtonian attraction to simple "relations of spherical surfaces of different radii." In other words, he reduced the law to spatial relationships between points of given mass. Therefore, for Kant the law is a universal and synthetic judgment because it is derived from the nature of space itself, an *a priori* condition of the mind.[93]

On the "certainty of the proof" of universal gravitation Newton says,

> As when a stone is projected obliquely, that is, any way but in the perpendicular direction, the continual deflection thereof towards the earth from the right line in which it was projected is a proof of its gravitation to the earth, no less certain than its direct descent when

[91] Newton, *Optics*, Qu. 31, 3rd ed. (London, 1721), p. 351.
[92] Kant, *Prolegomena*, 38.
[93] *Ibid.*

suffered to fall freely from rest; so the deviation of bodies moving in free spaces from rectilinear paths, and continual deflection therefrom towards any place, is a sure indication of the existence of some force which from all quarters impels those bodies towards that place.[94]

A careful analysis of the argument shows that this is not so much a proof of universal gravitation as an assumption of universal gravitation. While the falling of a stone proves some kind of terrestrial gravitation, the " falling " of a planet toward the sun presupposes that the planet tends to move in a " straight line "—a proposition which cannot be proved logically or from the behavior of heavy bodies whirled in a sling. A certain universality may be assumed upon which to construct mathematical laws, but this is not to be confused with the actual proof of such a universality. In this sense Kant is more correct in reducing the law to the structure of mental space than are those who consider universal attraction to be an empirically proven fact.

The Newtonian law of gravitation is usually expressed this way: Every particle in the universe attracts every other particle with a force which is directly proportional to the product of the masses of the particles and inversely proportional to the square of the distance between them.[95] Thus if M and M' denote the masses of two particles and r their distance apart, the force (F) of attraction is equal to

$$\frac{G \times M \times M'}{r^2}$$

where the constant multiplier G is the constant of gravitation and measures the attraction of two particles of unit mass at unit distance apart. Since the force is always proportional to the mass acted upon, and produces the same change of velocity

[94] Newton, *System of the World*, n. 4, ed. Cajori, p. 552.

[95] From A. Ramsey, *An Introduction to the Theory of Newtonian Attraction* (Cambridge, 1949), p. 20.

whatever that mass may be, the change of velocity, or "pull," tells us nothing about the mass in which it takes place, but only about the mass which is "pulling." The accelerations due to different pulling bodies, as for instance that of the sun pulling the earth, with that of the earth pulling the moon, can be compared one against the other to determine the respective masses and accelerations. But as the mass of the earth is always taken as unity, its actual mass is not determined. Astronomical calculations deal only with the acceleration, the product of G times mass acting and not with the actual value of G.

To weigh the sun, the planets, or the earth, in pounds or kilogrammes, or to find G, we must descend from the heavenly bodies to earthy matter and either compare the pull of a weighable mass on some body with the pull of the earth on it, or else choose two weighable masses and find the pull between them.[96]

Over the past century and a half numerous attempts have been made to measure the gravitation pull between two known masses in an effort to determine the value of G and M. It is commonly thought that these efforts prove the existence of a universal gravitational pull.

Newton himself rejected the possibility of measuring any pull between terrestrial bodies, for the force would have to be incredibly small.

A sphere of one foot in diameter, and of a like nature to the earth, would attract a small body placed near its surface with a force 20,000,000 times less than the earth would do if placed near its surface; but so small a force could produce no sensible effect.[97]

However, many attempts have been made to measure such a force. Two types of experiments have been carried out.[98] The

[96] J. Poynting, *Collected Scientific Papers* (Cambridge, 1920), p. 360.

[97] Newton, *System of the World*, n. 22, ed. Cajori, pp. 569-570.

[98] Cf. Newman and Searle, *General Properties of Matter*, 4th ed. (London, 1950), pp. 54-62; see also Poynting, *op. cit.*, pp. 613-644, and his own efforts, *ibid.*, pp. 1-164.

first type, such as the "mountain experiment" of Bouguer, Maskelyne, and others, as well as the "mine-method" of Airy and von Sterneck, tried to measure the horizontal pull exerted on a plumb-line by some determinable density of the earth. But these attempts to utilize large natural masses were of doubtful value due to the difficulty of calculating the quantities and to the impossibility of excluding extraneous influences. The second type of experiment, employed by Cavendish, Eötvös, Poynting, Heyl, and many others, tried to deal directly with the mutual pull between bodies of comparatively small size. In this case the supposed gravitational forces must be so small that refined methods of observation are needed, and all other forces affecting the body must be negligibly small, or accurately measured. One of the principal results of this type of experiment was the realization that a highly sensitive apparatus is needed to determine the "pull"—and therefore very susceptible to disturbing influences.[99] However from a great number of experiments by different methods, due corrections being made, satisfactory values can be ascribed to G and M. Thus Poynting says,

> In the case of such a constant as that of gravitation, where the results have hardly as yet begun to close in on any definite value, and where, indeed, we are hardly assured of the constancy itself, it is important to have as many determinations as possible made by different methods and different instruments, until all the sources of discrepancy are traced and the results agree.[100]

One important observation, however, must be made about this attempt to measure the minute pull between two small masses. Supposing that the ideal experiment could be carried out, in which all disturbances could be eliminated (which is not the

[99] Cf. Poynting, *op. cit.*, pp. 632-3; 621-627; Newman and Searle, *op. cit.*, pp. 59-61.

[100] Poynting, *op. cit.*, pp. 43-44. It must be pointed out, however, that this was written by Poynting in his famous article of 1891, *On a Determination of the Mean Density of the Earth and the Gravitation Constant by Means of the Common Balance.*

case at present) and a real "pull" detected, this in itself would not prove that bodies fall to the earth because of that force. There is no necessary connection, logical or philosophical, between a conceivably detectable "attraction" between bodies and gravity by which heavy bodies fall to the earth. The attraction may easily be caused by forces other than gravitation. The point is that the existence of some attractive force does not in itself prove that bodies fall to the earth because of that force; the identity of the two forces would have to be demonstrated. The tendency of mathematics is to unite as many phenomena as possible. This it can do because it abstracts from important differences which are found in reality. The mathematician's ideal is to describe all natural phenomena in a single equation; but this cannot be done without abstracting from differences which, to the natural philosopher, are extremely significant. The point is not to deny the validity of mathematical abstractions and universal unifications but to point out that they are abstractions.

From a philosophical point of view one of the principal defects of gravitational attraction—as a philosophical theory—is oversimplification. It assumes that bodies are themselves inert and that all motion must be conferred from without.[101] It considers characterless masses spatially distant from other masses, disregarding the intricate dependencies of every body upon the whole qualitative environment. Inert masses divested of qualities, spontaneity, and finality can certainly be conceived; in fact, such conceptions are very clear and distinct. But it is another matter altogether to make these abstractions the actual structure of reality. This is what Whitehead calls the "Fallacy of Misplaced Concreteness" in which abstractions are given real

[101] The distinction between inertial and accelerated motion is not relevant here, for inertial motion receives no explanation and accelerated motion is defined by the external force. Cf. "Natural and Compulsory Motion," The New Scholasticism, XXVIII (1954).

existence.[102] Whitehead insists that qualitative characteristics and intrinsic dependence upon the whole spatiotemporal reality is essentially relevant to every body actually existing. Bergson had previously objected to the "spatialization of time" in which the dynamic reality of temporal duration is turned into a series of static points. In other words, it is easy enough to conceive characterless masses, located in absolute space, isolated in time, and mutually attracting. But this is an over-simplification of the real state of nature as it is perceived in human experience. Relativity physics at least insists upon the essential dependence of every event upon the spatiotemporal environment.

A further philosophical difficulty is offered by the meaning of "gravitational force." Newton insisted very strongly that the force (F) operating between two bodies "is one single intermediate action, by which both approach nearer together"; the bodies "do not make two but one operation between two terms."[103] From a mathematical point of view this is precisely all that the quantity F signifies. But when the attractional theory is projected into a philosophical theory, the force of attraction must be considered as a physical reality; and the question arises, "What is it?" and "Where is it?" It is commonly thought that each particle has within itself a "force of attracting" other particles, so that there are as many "forces" as there are particles. But the important point to note is that the resident "force" has nothing to do with the body's own movement; it is posited to explain the movement of *another* body. Thus even though two bodies are said to attract mutually, the actual movement of any one body is explained by the pull of the *other*. Thus the whole function of the resident "force" is to account for the movement of other bodies. It has nothing to do with the body's own behavior. It is this aspect of attractional force which makes it so unintelligible. It is easier to see

[102] Whitehead, *Science and the Modern World, ed. cit.*, pp. 64-70, 72 ff.
[103] Newton, *System of the World*, n. 20, ed. Cajori, p. 569.

how an intrinsic force may account for the behavior of the body actually moving; and, indeed, it is logical to suppose that the performer in nature is itself accountable in some way for its own movements. The great variety of activity we see in the world, the intricate dependencies and variations, are intelligible only if we recognize the complex variety of things themselves—things which are not characterless masses but "events" vested with qualities and woven into the whole fabric of reality. An innate force which has no relevance to the body itself must be characterless and unintelligible, for it is empty and explains nothing. What is it? Leibniz was probably right when he called it "a senseless occult quality, which is so very occult that it can never be cleared up, even though a Spirit, not to say God Himself, were endeavoring to explain it."[104] An inexplicable force such as gravitational attraction may be useful in combating atheism,[105] but it does not contribute to a philosophy of nature. To replace the Aristotelian notion of "nature" by some force of gravitational "attraction" is not only to shift the problem, but to shift it to a position where it can never even be clarified.

In concluding this section we must emphasize again the vast difference between a mathematical science of nature and the philosophy of nature. A mathematical science necessarily abstracts from qualitative differences, causality, and even from the function of nature itself. Within this limited domain there is perfect justification and unlimited possibilities. The philosophy of nature is a distinct and vastly different science, the validity of which depends upon the whole of human experience concerning natural reality. It is only when a mathematical view is projected into a philosophy without recognizing its true foundations, that serious difficulties arise. These difficulties can

[104] Leibniz, *Philosophische Schriften*, ed. Gerhardt, III, 519.

[105] De Guevara y Basoazabal, *op. cit.*, pp. 156-7; also sermons of Richard Bentley, cf. Brewster, *Life of Sir Isaac Newton*, pp. 256-263.

be solved only by an analysis of meaning and a critical examination of the historical and theoretical foundations of the divergent views of reality.

III. Einsteinian Relativity

A thorough examination of Einstein's theory of general relativity would bring out more clearly the point we are trying to defend. But a complete analysis of the modern view of gravitation requires much more than a few pages. However, without even initiating such an attempt, we must draw attention to a few features of the relativity theory of gravitation.

It has already been pointed out that the history of relativity arose because of certain doubts cast upon the fundamental concept employed in Newtonian physics.[106] Even as early as the middle of the last century questions were raised as to the meaning of "inertial motion," for inertial motion requires the existence of some absolute frame of reference according to which the motion of a body is uniform and directed in a straight line. C. Neumann, for example, presented certain paradoxes which follow from the Newtonian laws, but he thought that all difficulties could be removed by considering motion as absolute and determined in relation to a hypothetical body *alpha*.[107] Most physicists of the time were inclined to follow him or to postulate an absolute ether. Others, however, like Ernst Mach, preferred to maintain the relativity of all motion and to take issue with the law of inertia as expressed in Newtonian physics.[108] But no satisfactory theory of relativity was reached

[106] Cf. also R. Dugas, *Histoire de la Mécanique* (Neuchatel, 1950), pp. 419-443.

[107] In our own day this opinion is followed by P. Hoenen, who identifies it with the absolute ether, cf. *Cosmologia*, 4th ed. (Rome, 1949), pp. 64-70, 493-497. "Ita 'corpus alpha,' quod a Neumann fingebatur, sese revelat ut ens reale: aetherem, quo ceterum iam indigemus, ut relationes locales corporum, inter quae sunt stellae fixae, oriri possint." *Ibid.*, p. 496.

[108] E. Mach, *The Science of Mechanics* (Chicago, 1907), pp. 222-238, 567-

until 1905 when Einstein successfully interpreted the Lorentz transformation and the Fitzgerald contraction on the basis of the constant velocity of light. In 1908 the famous mathematician Minkowski made a remarkable discovery concerning the Lorentz formulae. He showed that, although each observer has his own private space and private time, a public concept which is the same for all observers can be formed by combining space and time in a four-dimensional continuum.[109] But this combination of inertial systems, as we have already seen, introduces a " curvature " in the geometry employed. When Einstein extended his theory of relativity to include accelerated systems (general theory of relativity) a non-Euclidean geometry of the Riemannian type was used.[110] According to the general theory no preference is given to any particular observer in either inertial or accelerated motion; by using the " curvature " of Riemannian geometry any event may be described, which if true for one observer, will automatically be true for all. Since the special theory of relativity is considered to be a restricted case of the general theory, all events receive the same description and there is no distinction between inertial and gravitational motion.[111] From one point of view the general theory reduces all motion to gravitational, that is, accelerated motion; for this reason it is commonly called " Einstein's theory of gravitation." But from another point of view all gravitation is reduced to inertial systems; for this reason Sir Edmund Whittaker says, " What Einstein's theory really does is to abolish the old idea of gravitation altogether and to replace it by the idea of inertial frameworks." [112]

573; *History and Root of the Principle of the Conservation of Energy* (Chicago, 1911), pp. 75-85.

[109] Cf. R. Dugas, *op. cit.*, pp. 468-473.

[110] H. Weyl, *Philosophy of Mathematics and Natural Science* (Princeton, 1949), pp. 67-110.

[111] See E. Freundlich, *The Foundations of Einstein's Theory of Gravitation* (London, 1924).

[112] E. Whittaker, *From Euclid to Eddington, ed. cit.*, p. 115.

In this geometrical picture of the universe the central place is held by the "curvature" of space-time, which represents the actual path, or geodesic of the moving body. The degree of curvature depends upon the intensity of the gravitational field $G_{\mu 2}$, which is specified by the values of $K_{\mu 2}$ describing the distribution of motion and matter in that region. Therefore the Einsteinian law of gravitation, $G_{\mu 2} = K_{\mu 2}$, expresses both the curvature of space-time and the amount of mass present, mass being measured by velocity. In other words relativity presents a purely geometrical picture of physical measurements.

Many popular works on relativity triumphantly speak of the abolition of Newtonian "forces" in their account of gravitation.[113] Gravitation is pictured as the result of the curvature of space-time, or the structure of the space-time continuum. That is to say, a heavy body falls to the ground because of the structure of the field; the field is so curved that the body must take that path. But a difficulty arises from the fact that the so-called curvature of space-time depends upon the presence and motion of the matter being considered. Dr. Whitrow refers to this ambiguity which constantly arises in explaining the theory of relativity.[114]

> The expressions for the energy and momentum of a given material system depend on certain numbers characterizing the structure of space-time, but these numbers in turn depend on the distribution of matter contemplated.[115]

This ambiguity inevitably arises when we try to think of Einstein's system as dealing with the philosophical structure of reality. The tendency is to project the system into a philosophi-

[113] For example, B. Russell, *The ABC of Relativity* (London, 1925); A. Eddington, *The Nature of the Physical World* (London, 1947); Einstein and L. Infeld, *The Evolution of Physics* (Cambridge, 1947), (actually written by Infeld).

[114] G. Whitrow, *The Structure of the Universe*, ed. E. A. Milne, pp. 73-74.

[115] *Ibid.*, p. 74.

cal theory and to think of gravitation as a result of the spatio-temporal structure of the universe. The imagination is tempted to form a mechanical view from the theory of relativity because this is a simple picture of phenomena. But such a view, supposedly based on relativity, is even less tenable than Newtonian attraction. To explain the movement of bodies as a result of the field or the " curvature " of space-time is to present a mechanical explanation without any real basis in relativity theory. In the first place, the so-called " curvature " is not a physical reality at all; it is strictly a geometrical curvature constructed from physical measurements. " It is not the space that is curved, but the geometry of the space." [116] There is no justification for giving that curvature physical existence and for making it the cause of movement. In the second place, the curvature does not represent merely the field in which bodies move, as though field and mass were two distinct factors, but it represents field (energy) and mass as a single measurement. The basic tenet of relativity is the equivalence of mass and energy, $E = mc^2$. In this equivalence there is no theoretical basis for distinguishing body and the surrounding field.[117] What actually results is a geometric continuity of various curvatures, representing a continuous " field " of various intensities. But here " field " is taken in a new sense—as seen through the eyes of geometry. Many popularizers of relativity are perplexed by these difficulties. Bodies and the surrounding environment are obviously distinct realities, yet in relativity theory they are one. There are obviously distinct realities in the universe, yet relativity considers all as a single continuum. There must be some cause of movement, but relativity can offer no cause. The solution of these difficulties lies in the fact that the theory

[116] E. Whittaker, *From Euclid to Eddington, ed. cit.*, p. 40.

[117] H. Weyl, *Philosophy of Mathematics and Natural Science* (Princeton, 1949), p. 171; cf. also Einstein and Infeld, *Evolution of Physics, ed. cit.*, pp. 255-258.

of relativity is not a philosophical theory, but a *mathematical* theory of nature.

The important point is that sciences based on a mathematical theory and a philosophical theory of nature are *two distinct sciences,* each of which has a determined and limited role in human knowledge. The great value of Einstein's revolution is that it brings out more clearly than ever the determined character of a mathematical theory of nature. The scholastics had always maintained a distinction between natural philosophy and the mathematical sciences of nature, the *scientiae mediae.*[118] But the sudden development of these sciences in the seventeenth century dislodged natural philosophy and the mathematical theory became the accepted philosophy. That is to say, the valid *mathematical* view was projected into a philosophy by a method of simple transference; abstractions became realities. Qualities, which are necessarily relinquished in mathematical abstraction, were denied also in nature. Functional dependencies in mathematics became mechanical causes in nature; and true causality, which is inconceivable in mathematics, became inconceivable in reality. Some philosophical view of nature has always been necessary for man; and it is obvious that human experience has something to say about its formation. The question is, how much can mathematics *dictate* about such a philosophy? From the seventeenth century to our own day it has been thought that a complete dictatorship exists; that a one to one relationship obtained between mathematics and philosophy. But with the theory of relativity such a one to one relationship is impossible, for if it is carried out, the greatest certainties of experience are rendered nonsensical. The mathematical theory cannot be *simply* transferred to the world of human experience, which is the world of philosophy. Such a simple transference is the "Fallacy of Misplaced Concreteness," to use Whitehead's ac-

[118] St. Thomas, *In Boeth. de Trin.*, V, 3 and 5 ad 7; *In II Phys.*, 3, nn. 8-9; Averroes, *In II Phys.*, comm. 18 (Venice, 1574), VI, fol. 55r, etc.

acurate expression. Therefore, the theory of relativity itself demands a new philosophy, which is not a mere projection of mathematical abstractions but a philosophy which corroborates and justifies the mathematical theory. The relationship between mathematical theory and a true philosophy of nature is not one of identity or simple projection; nor is it one of amicable isolation. Mathematical theory and the philosophy of nature are truly distinct sciences; they differ in foundation, method, knowledge-value, and logical significance. But both constitute valid knowledge of the world we live in.

The fundamental difference between the two types of knowledge may be expressed briefly. The scope of natural philosophy is the world of human experience regarding nature. Whatever is given in human experience must be accepted; and this includes the nature of man himself. The character of mathematical science lies in the nature of mathematical abstraction. A mathematical theory of nature is based on measurements and measurements alone. Whatever cannot be measured is of no use in mathematical theory. But to the natural philosopher even the non-measurable data of experience are important. Since, therefore, mathematics leaves out of consideration the non-measurable data of experience, it is clearly quite distinct from philosophy, which considers the whole of that experience.

From our study of gravitation it is clear that the theory of relativity is incompatible with the philosophical theory of mechanical attraction. Indeed it is incompatible with the whole outlook of all the mechanical philosophies proposed throughout the centuries. For reasons strictly within the domain of mathematical abstraction the theory of relativity forces us to reject the "simple location" of isolated bodies, as Whitehead has pointed out so clearly.[119] It forces us to recognize the reality of temporal emergence, a reality which Bergson fought so hard to defend. Furthermore the theory of relativity forces us to admit

[119] Whitehead, *Science and the Modern World, ed. cit.*

a spontaneity which is *given* and essentially dependent upon the environment. Thus the Aristotelian theory of nature and gravitation finds a satisfactory complement in Einsteinian relativity.

Conclusion

The problem of gravitation is extremely difficult. Why does a body fall to the ground? The mind would like to give a simple reply, but a simple reply is often an over-simplification of a very complex reality. Furthermore, the views which have been given in explaining gravitation involve a particular outlook upon the whole of physical reality; and many of those outlooks have been formed by unjustifiable assumptions, uncritical acceptance of "proof," or even by personal prejudice. Concerning the problem of gravitation, as in other problems, what is needed is a careful analysis of the meaning implied in various views and a critical examination of their historical and theoretical foundations.

In examining the Aristotelian view of gravitation we have seen that there are two essential factors: an intrinsic principle of spontaneous movement, called "nature," and a suitable environment, or place, which is intended by the body seeking its own fulfillment. Nature must be understood as a principle of behavior actually given in experience. That is to say, "nature" is strictly a relative concept, the content of which is merely that which is actually experienced. "Nature" must not be conceived as an absolute entity lodged in bodies or as an "efficient mover," for such a notion, besides being contrary to the actual teaching of Aristotle and St. Thomas, merely shifts the explanation to an entity which can never be known. As a relative term, "nature" merely signifies the behavior that is actually known and the fact that it is spontaneously given; it is not an entity postulated behind known behavior to which an explanation can be shifted. In other words, the concept of nature involves the acceptance of observed characteristics as necessarily given. With

regard to the environment which is sought in natural motion we have seen that it is primarily a qualitative reality which a particular nature needs in order to achieve fulfillment of being. Secondarily, this place must have a certain immobility in order to account for the relational character of movement; but it is only a relative immobility which is justified in our conception of "place." That is to say, spatialization of place fails to account for the actual movement toward one place rather than toward another; and attributing absolute immobility to "place" is without real meaning. Therefore, we must conclude that the natural place of terrestrial bodies is essentially a qualitative environment which has relative immobility, at least as far as our knowledge is concerned.

An examination of the Newtonian view of gravitational attraction shows that Newton himself did not maintain the view promulgated under this name. In his personal view he attributed the cause of gravitation to God Who operated through absolute space, His extension and His "sensorium." But the mechanical laws according to which such gravitation took place were conceived by his followers as representing a mutual attraction of all particles throughout space, so that bodies fall to the ground because of the gravitational pull of the earth. Such a gravitational pull, however, has never been demonstrated by either Newton or his successors. Even the success of the mathematical laws does not prove physical attraction because of the character of mathematical abstraction. With regard to planetary movers we have seen that the law of inertia has not abolished the need of spiritual movers, but rather it has abolished the question of movers. With regard to terrestrial motion we have seen that the validity of the mathematical equations has nothing to do with the actual cause of gravitation, for those laws would have the same validity whether the cause were gravitational "pull," natural tendency, or spiritual forces. Therefore, gravitational attraction is not a physically proved explanation of gravitation.

Furthermore, the whole Newtonian picture of gravitation involves unwarranted assumptions about absolute space, time, and inertial motion, which amount to an oversimplification of a mathematical as well as of a philosophical theory of gravitation. If the whole of human experience is to be taken as a criterion, the philosophical theory of gravitation based upon mathematical theory is untenable for it involves assumptions which conflict with actual experience; and it renders a rational explanation of movement forever impossible by reducing it to an inexplicable force called attraction. The ambiguities of Newton's mathematical theory, moreover, led physicists to reject the Newtonian view of the universe and to replace it with the theory of relativity.

We have pointed out that the theory of relativity is essentially a mathematical theory, describing the measurable state of the universe in terms of non-Euclidean geometry. Although the tendency is to project this theory into a philosophical theory, every attempt to do so distorts the imagination or conflicts with the fundamental tenets of relativity theory. This apparent irreconcilability brings out most clearly the real difference between a mathematical and a philosophical theory of nature, which rests in the fact that mathematics abstracts from certain values of human experience and constructs its geometry to conform to physical measurements. Therefore, a simple transference of mathematical values into a philosophical theory is impossible; and an equivalent or congruent theory of gravitation is needed to supply the philosophical basis. Provided the distinction of the two sciences, mathematical theory and natural philosophy, be clearly kept in mind, it can be said that the Aristotelian theory of nature and gravitation offers a realistic basis and justification for the theory of relativity in its essential content.

Albertus Magnus Lyceum for Natural Science
Dominican House of Studies
River Forest, Ill.

From the Secretary's Desk

Association Meetings

AS THIS APRIL issue of The New Scholasticism will probably not appear until after the close of our Twenty-Ninth Annual Meeting at Philadelphia will have occurred and as we are writing as of the first of February we wish to express our appreciation to all those who contributed to the anticipated success of the meeting, both contributors of formal papers, those who joined in the discussion, and to Philadelphia members and friends who aided in the many details necessary for the conduct of the meeting. The secretary is especially appreciative of the testimonial volume of philosophical essays written and to be published in the name of the Association in recognition of his twenty-five years as Secretary and Treasurer and more recently as Secretary of the Association. More formal general expression of appreciation of such recognition has been made, and will be published in the forthcoming issue of the *Proceedings* of the Association, to the contributors particularly, and especially to the editor of the volume, the Rev. Dr. James A. McWilliams, S. J., professor of philosophy at St. Louis University who through the years has been a tower of strength to the Association and its officers, an elder statesman as it were, who has always given of his time and his pen in behalf of the objectives of the Association. Whatever service the Secretary has been able to render to the Association through these years has been a happy labor for what he considers to be a most worthwhile cause. In such a circumstance the service is self-rewarding.

Our Thirtieth Annual Meeting will take place on Easter Tuesday and Wednesday, April 3 and 4, 1956, at the Netherland Plaza Hotel, Cincinnati, Ohio. Near the end of May each member of the Association will receive a personal invitation to volunteer to contribute a half-hour paper to be read and discussed at some one of the six afternoon sectional meetings, on a subject or subjects to be suggested by the respective chairmen of the various sections. We hope very much that there will be a much larger response to these various chairmen before October 25, when a 150-word summary of how the subject would be treated must be in the hands of the respective chairmen. This whole procedure is for

the single purpose of enlisting the interest of as many members as possible in active participation. Only thus is our's a truly cooperative enterprise.

Affiliation with the Fédération Internationale des Sociétés de Philosophie

At its meeting in Chicago on Saturday, December 18, 1954, the Executive Council of the Association voted to accept the invitation of the Fédération Internationale des Sociétés de Philosophie, extended, through the secretary general of the Federation, Mr. Charles Perelman of Brussels, Belgium, to the American Catholic Philosophical Association to become a member of the Federation. The Federation comprises practically all of the philosophical associations or societies on both continents. Such a federation has for its general purposes the development of exchange of views and of scientific relations of philosophers in all countries in a spirit of freedom and mutual respect; to facilitate relations between philosophers when it is useful or necessary to have recourse to international cooperation; to increase contacts between institutions, societies, and the periodicals devoted to philosophy; to assemble sources useful for the development and organization of philosophical studies, its archives to be at the disposition of the member societies; to contribute financially to the development of such archives; and to the obtaining of such extraordinary means as would be necessary for philosophical activity on an international plan. The treasurer of the Federation, Professor A. C. Ewing, of Cambridge, particularly stresses the value of the Federation as a single united group in dealing with assignments through UNESCO in the United Nations. Present American members of the Federation's Executive Council include Professors Richard P. McKeon of the University of Chicago, Brand Blanchard of Yale University, R. Klibansky of Montreal and F. Romero of Buenos Aires.

For the general information of our membership we herewith publish the statutes of the Federation with the exception of the last two articles which describe the routine duties of the Director.

Fédération Internationale des Sociétés de Philosophie

STATUTS

Chapitre I

Nature, but, siège et durée de la Fédération

Art. 1. — La Fédération Internationale des Sociétés de Philosophie groupe les Sociétés, nationales ou internationales, dont l'activité propre est le développement des études et des recherches philosophiques.

Art. 2. — Le but de la Fédération est le suivant:

a) Contribuer directement au développement des échanges de vues et des relations scientifiques entre les philosophes de tous pays, dans un esprit de liberté et de respect mutuel;

b) Faciliter les relations entre les philosophes des divers pays lorsqu'il est utile ou nécessaire d'avoir recours à une coopération internationale;

c) Favoriser les contacts entre les institutions, les Sociétés et les Revues périodiques, consacrées à la Philosophie;

d) Rassembler une documentation utile au développement et à l'organisation des études philosophiques. Des Archives seront ouvertes et tenues à la disposition des membres des Sociétés fédérées;

e) Contribuer par tous les moyens financiers, cotisations ou autres ressources, à la formation, au développement et à l'entretien de ces Archives philosophiques;

f) Lorsque le besoin s'en fera sentir, et moyennant l'obtention de crédits extraordinaires, entreprendre telles autres tâches dont l'accomplissement sera profitable à l'activité philosophique sur le plan international.

Art. 3. — La Fédération peut recevoir certaines subventions des différents Gouvernements ou des Organisations intergouvernementales, ainsi que des donations de Sociétés privées ou de particuliers, afin d'entreprendre certaines tâches, recherches, publications, ou d'organiser certains Congrès, à condition que ces activités se rattachent clairement aux fins propres qui sont les siennes et qu'elles soient de nature à faciliter, sur le plan international, le progrès des études philosophiques et leur communication au monde savant et au public cultivé.

Dans les cas ici prévus, la Fédération pourra, soit procéder elle-même

à l'exécution de ces travaux, soit la confier à une organisation compétente à qui elle transférerait, dans ce cas, le montant de la subvention afférente au travail à effectuer, tout en gardant la responsabilité dernière des résultats.

ART 4. — Le siège de la Fédération Internationale des Sociétés de Philosophie est, dans les conditions statutaires, fixé à Paris, 17, rue de la Sorbonne (Sorbonne).

ART. 5. — La durée de la Fédération est illimitée.

CHAPITRE II

Composition de la Fédération

ART. 6. — Seules peuvent demander leur admission à la Fédération les Sociétés de philosophie régulièrement constituées.

ART. 7. — L'admission des membres est prononcée sur leur demande par le Comité Directeur à la majorité des ¾, sauf appel devant l'Assemblée Générale.

ART. 8. — Tous les membres de la Fédération bénéficient des avantages et supportent les charges prévus par les présents Statuts.

Ils prennent part aux travaux de l'Assemblée Générale dans les conditions fixées par l'article 11 ci-après.

Ils versent une cotisation normale annuelle, proportionnelle aux cotisations de leurs membres sociétaires, et qui ne peut être inférieure à 5% de leur montant. Les fonds provenant de ces cotisations seront intégralement affectés à l'entretion des Archives philosophiques.

ART. 9. — La qualité de membre de la Fédération prend fin:

a) Par la démission, subordonnée à préavis d'un an;

b) Par l'exclusion, prononcée par l'Assemblée Générale à la majorité des deux tiers des votants, pour cause:

1. de non-application des clauses des présents Statuts;
2. d'opposition systématique à la réalisation des buts de la Fédération.

CHAPITRE III

Fonctionnement de la Fédération

ART. 10. — Le fonctionnement de la Fédération est assuré par l'Assemblée Générale et le Comité Directeur.

ART. 11. — L'Assemblée Générale comprend les représentants de

toutes les Sociétés membres, à raison d'un délégué pour chacune d'elles, dûment mandaté à cet effet. Tous les délégués participent aux travaux de l'Assemblée avec droit de délibération. Mais chaque Nation ne peut avoir plus de 2, ni l'ensemble des sociétés internationales plus de 12 délégués jouissant du droit de vote.

ART. 12. — L'Assemblée Générale se réunit en session ordinaire à l'occasion des Congrès Internationaux de Philosophie, qui ont lieu, en principe, tous les quatre ans et, en session extraordinaire, toutes les fois que les circonstances paraissent l'exiger.

L'initiative de la convocation revient, dans tous les cas, au Président du Comité Directeur.

ART. 13. — Les travaux de l'Assemblée sont effectués par les délégués présents et dûment mandatés. Les représentations sont valables à condition qu'elles soient formulées par lettre adressée, par la Société intéressée, au Président du Comité Directeur, au moins une semaine avant la réunion de l'Assemblée, en indiquant:

a) Le nom du mandataire;

b) La portée du mandat.

ART. 14. — La compétence de l'Assemblée s'étend à toutes les questions relatives à l'activité de l'organisation.

En particulier:

a) Elle établit le budget de la Fédération et assure le contrôle de la gestion précédente;

b) Elle se prononce sur les cas d'exclusion des membres;

c) Elle procède à élections pour constituer ou renouveler le Comité Directeur;

d) Elle trace les grandes lignes de l'activité du Comité Directeur et se prononce sur son activité passée;

e) Elle procède, s'il y a lieu, à la révision des clauses des présents Statuts, si elle en est saisie par le Comité Directeur, ou par l'initiative des deux tiers des membres;

f) Elle peut nommer des Commissions chargées d'étudier des problèmes particuliers et de lui soumettre des rapports.

ART. 15. — Les décisions en assemblée plénière sont prises à la majorité absolue.

Dans les cas urgents et sur décision du bureau, des votes peuvent avoir lieu en dehors des assemblées plénières et par correspondance.

ART. 16. — L'Assemblée est présidée par le Président de la Fédération, qui, sur consultation du Comité Directeur, prépare son ordre du jour, et fait rédiger les comptes rendus des débats.

WORKSHOP IN THE TEACHING OF PHILOSOPHY

We are in receipt of an announcement of a workshop in the teaching of philosophy sponsored by Marquette University, Milwaukee, Wisconsin, for June 13-16, 1955. Rev. Dr. Francis C. Wade of the department of philosophy is program chairman. The successive days of the workshop are devoted to four main problems: a) The role of Philosophy in Catholic education; b) The relationship between Philosophy and Theology as seen in Natural Theology; c) The relationship between Philosophy and History as seen in the History of Philosophy; and d) The relationship between Philosophy and Science as seen in Philosophical Psychology. The successive programs have for their discussion leaders: Dr. John O. Reidl, Dean of School of Graduate Studies, Rev. Dr. Gerard Smith, S. J., head of Department of Philosophy, Dr. Charles J. O'Neill, professor of philosophy of Marquette, and Rev. Dr. George Klubertanz, S. J., professor of philosophy at St. Louis University. Applications for registration may be made to Rev. Eugene H. Kessler, S. J., Marquette University, Milwaukee 3, Wisconsin.

INTERNATIONAL INQUIRY INTO TEACHING OF PHILOSOPHY

Our membership will be interested in the publication of a volume entitled *The Teaching of Philosophy*, edited by Georges Canguilhem, published under the auspices of the United Nations Educational Scientific and Cultural Organization at Paris, France. This report of an international inquiry into the teaching of philosophy embodies a sixteen page questionnaire and replies of the experts of eight countries: France, Germany, Italy, Britain, United States of America, India, Egypt and Cuba. With these are the joint statements and general conclusions of a committee of nine philosophers, all proposed for further discussion. No reply is concrete enough to meet the current need of directing the true liberty of research while avoiding either ideological or personal dogmatism. It is emphasized that it "is particularly necessary for teachers of philosophy in view of the average age at which students are first introduced to philosophy and in view of the human significance of the problems it deals with . . . that while it should be concerned with clarifying firsthand experience . . . were philosophy to be a slavish

analysis of individual experience it would cease to represent a quest for universally acceptable principles and a realism of values." (pp. 13-15)

Lecture Series

The Secretary is in receipt of an announcement of the second McAuley lecture series sponsored by St. Joseph College, West Hartford, Connecticut. This series under the general title of "Christian Humanism in Letters" (1954) includes the following lectures: a) "The Individual and the Type in Mediaeval Literature" by Professor Howard R. Patch of Smith College; b) "Renaissance Humanism and the American Catholic Mind" by Rev. Walter J. Ong, professor of English at St. Louis University; and c) "Catholic Humanism and Modern Letters" by Professor Marshall McLuhan of University of Toronto. The volume may be obtained at the Department of Publications, St. Joseph College, West Hartford, Connecticut, price $1.00.

Our members may also be interested in a series of four public lectures under the auspices of the Charles R. Walgreen Foundation for the study of American Institutions at the University of Chicago on the subject "Religion in America: The Catholic Church in the United States" (An Historical Survey) by the Rev. Dr. John Tracy Ellis, professor of church history at the Catholic University of America and secretary of the American Catholic Historical Association. These lectures will be published by the University of Chicago Press.

The Aquinas lecture at Marquette University for this year was given by Dr. Charles J. O'Neil of Marquette on the subject, "Imprudence in St. Thomas." Two excellent recent additions in this notable series now published are that of Dr. Elizabeth Salmon of Fordham University on *The Good in Existential Metaphysics* and that of Dr. Vincent E. Smith of the University of Notre Dame on *St. Thomas and Geometry.*

Appointments in Philosophy

The secretary reminds the membership that he has on file the names of a number of persons who are seeking appointments in the field of philosophy, all of whom have excellent academic training and in some instances considerable experience. This office is anxious to bring these applicants for positions to the attention of administrators in our Catholic colleges and universities. The secretary is glad also to list others who may be seeking appointment. It is his hope that this

office may be a clearing house for professional appointments in this teaching field.

Miscellaneous Items

The Department of Philosophy at the University of Notre Dame is continuing this year its summer school program in the philosophy of science. The theme of this year's program will be philosophy, psychology, and biology. Special attention will be paid to the teaching of these subjects in the liberal college. The dates of the summer session are June 17 to August 2.

The secretary asks the various local conferences of the Association to report their progress during the year and their prospect for the coming year for publication in the July issue of The New Scholasticism. He also invites news items generally which would be of interest to the Association members.

The secretary is in receipt of a paper-covered volume of the Mentor Philosophers entitled *Mediaeval Philosophy—The Age of Belief*, published by the North American Library at 501 Madison Avenue, New York 22, New York, at 50¢, and edited by Ann Fremantle. The volume, in addition to an introduction on the nature of philosophy, contains selections from the works of St. Augustine, Boethius, Erigena, St. Anselm, Abelard and St. Bernard, the Arabs, St. Bonaventure, St. Thomas Aquinas, Duns Scotus and William of Ockham.

We are also informed that Jacques Maritain's *Creative Intuition and Art in Poetry* is now available in the Meridian Book series at $1.35.

Charles A. Hart,
National Secretary.

The Catholic University of America,
Washington, D. C.

Book Reviews

Philosophy of Law. **By Georgio Del Vecchio. Translated by Thomas Owen Martin. Washington, D. C.: The Catholic University of America Press, 1953. Pp. xxiv + 456, with index. $6.50.**

Professor Rommen notes in *The Natural Law* that Karl Berghohm, who so assiduously hunted down historical traces of natural law theory in order to combat it, discovered essential elements of this outlook everywhere "even in the thinking of the strictest positivists of the late nineteenth century" (*The Natural Law* by H. Rommen [St. Louis, 1947] p. 215). In other words, Berghohm himself "was forced to admit that all men are born natural-law jurists" (*op. cit.*, p. 133), a point scholastics might make more of as they plead the cause of conformity to human nature, their celebrated proximate norm, or extol the merits of their "common sense," so called. The natural law elements of Del Vecchio's work, the interesting parallels and implications in his philosophy (of which he was duly aware) will be the first to draw the sympathetic interest of our readers to the present work.

The fact that Del Vecchio's reputation is world wide, that this volume now translated into English for the first time has gone through nine Italian editions to date, two French, two German, five Spanish, two Portuguese, two Turkish and one Japanese seems indirectly to substantiate Berghohm's conclusion. This same world wide reputation tends also to hearten the modern scholastic who endeavors to reestablish the *philosophia perennis* in universities from which it has in the past been dislodged by a once omnipresent positivism. In fact, the great value of the work in the pursuit of this enterprise largely accounts for the present translation by a professor at the Catholic University.

Del Vecchio himself, however, must be recognized as a Neokantian, a right wing representative of the school, increasingly opposed to the agnosticism and relativism of such a member as Hans Kelsen. He has, in fact, been compared by Roscoe Pound to the scholastic, François Geny, a lead which offers some promise in view of Del Vecchio's quite Aristotelian attitudes towards man as both a social and moral being; but he falls short of the more comprehensive goal of harmonizing reason and revelation and of reaching an independent ethics not only compatible with but independent of faith, as *sui juris*.

Here his traditional Kantianism is at fault by way of defect. Thus when he has dismissed theologism as an insufficient "rational foundation of law" (in a fideistic view), he must turn to a reason which does not reach to God. Though he has likewise vigorously rejected scepticism, empirical realism, and utilitarianism, he does not succeed in finding in the sole remaining notion of nature, as he conceives it, a strong enough basis on which to rest law. His preconception leads him into murky passages on the "physical" and "metaphysical" which are hard to thread one's way through, and end one knows not where.

What appears to be a consequent of this failure to ground law in a nature which is first and foremost physical because God has created it as a source of operations is another Kantian weakness common to the school—a traditional formalism. In view of the "fluctuations," the "evolution," and the "inconstancy" of law as manifested by history, Del Vecchio resolutely seeks the universal ("the multiple presupposes the unit," p. 251); but this turns out to be not a norm or juridical proposition itself but something without content, not even an "ideal of law." It is merely a logical form "which does not tell us at all what is just or unjust." One senses high moral earnestness, indeed; but this experience is accompanied by a sense of frustration. Somewhat impatiently perhaps, the scholastic, aware of the logical and historical results of Kant's divorce of law from morality, hurries past these pages which stir up so many pale ineffectual ghosts.

It might seem unkind at this juncture to cite Professor Brown's note in an excellent Foreword that Del Vecchio in earlier days embraced Fascism. We hasten to add that he never held office within it, that at the same time he stressed the rights of the person and the principles of justice, that he expressed his views courageously and in turn was later persecuted by the party. The point is simply that we doubt the cogency of a Kantian outlook to cope with the philosophy of Fascism. It is worth noting, too, in this regard that students of Del Vecchio are divided on the issue whether or not the eminent jurist's attitudes are post-Kantian in the sense that they have become Hegelian. Brown here contents himself with the remark that his conclusions are more scholastic than Hegelian (p. xviii) but points out pertinently in what their weakness consists.

Lest we become pre-occupied with strictures, let it be said that Del Vecchio's views are not only well worth Dr. Martin's trouble in presenting them to English readers, but they contain much that is of

permanent and independent importance. As a critic Del Vecchio is a formidable adversary; as an exponent of Neokantianism he is faithful and lucid. To end somewhat as we began, we are personally most grateful to him for having, through his immense influence, widely disseminated so much that is *verum, bonum, et pulchrum.*

G. J. GUSTAFSON, S.S.

St. Edward's Seminary,
Kenmore, Washington

The Good in Existential Metaphysics. **The Aquinas Lecture. By Elizabeth G. Salmon. Milwaukee: Marquette University Press, 1953. Pp. 93. $2.00.**

The author of the Aquinas lecture for 1952 has a definite aim. She proposes to plumb the meanings of the metaphysical good and to show its connection with the moral good. In spite of the necessarily restricted limits demanded by the nature of such a lecture, Miss Salmon offers a clear, concise and interesting *aperçu* of her interpretation of this difficult doctrine.

The notion of the good is a primary notion. What is the meaning of primary in the metaphysical sense? What is the angle of vision under which the notion of the transcendental good arises? How does the good differ from being, from the moral good, from the life of faith? These profound problems present themselves at the outset of a study of "the good."

The first consideration is taken up with being. This notion is obtained through abstractive knowledge. Hence, according to the author, this knowledge can be called an "abstractive vision," or a "non-intuitive abstractive vision," that is to say, a vision of actual existing being intellectually expressed in an existential judgment. This non-intuitive abstractive vision expresses the "intelligibility of anything that is" (p. 5). "Being stresses the absolute position of what is" (p. 8). A being is an existing essence. When this truth is recognized as the law of everything which exists, there is formed the transcendental notion of being.

This notion of being which affirms a vision of all existing reality would be the richest, the most comprehensive knowledge of reality. One may ask: How could such knowledge be abstractive? From what does it abstract? And if it is the richest knowledge obtainable, then

why bother with analogous judgments as regards individual beings? I submit, therefore, that the notion of being as well as the transcendental good is not a vision, but the term of a reflexive analysis. It is not the richest notion in its contents but the most indefinite, for it expresses an indefinite relation of essence to *esse*.

From this consideration of the transcendental notion of being we are able to proceed to an examination of the good. For, to quote the author,

> Through a continuing reflection, a contemplation of act and primarily of 'that act of existence as the perfection of all perfections' a new angle of vision develops.[1] . . . (and) . . . we suddenly realize to a certain degree that '*esse igitur actu boni rationem constituit.*' (p. 13).

Miss Salmon justly refuses to identify the transcendental good with that which is suitable to the will, that is to say, suitable to human nature. "The activity of the will, its love, is to love the thing not just as perfecting it, but as perfection, as it is in itself" (p. 34). It might be more exact to add, in order to avoid any trace of quietism, that this love is *de facto* perfective and perfecting, and that this fact can never be excluded in the act of love. This fact is at least implied in any true love. Indeed we must love all reality, for the rightly ordered love we have for all beings is not only suitable but necessary for the attainment of our last end.

These reflections bring to focus the moral problem. The metaphysical basis for the notion of moral value is the metaphysical good (cf. p. 42). Now the good is the fullness of existing. Hence, in seeking being in so far as it exists, in so far as it is good, the human will is manifesting its natural urge towards the pure act of existence who is God. That is why we cannot *ordinately* love the individual good without loving God. For He is Goodness Itself, the principle of all beings in so far as they are. And these beings are truly good because they participate, in Him Who is *Ipsum Esse*. Hence the rational, true love of these beings include as its term the love of God.

Finally, Miss Salmon presents a connecting link between the good in the order of nature and the good which is the elevation of nature through faith and love to an intuitive vision of the Divine Essence, a possession

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[1] This contemplation of the act of existence does not seem possible in this life. Certainly it has nothing to do with a philosophical abstraction; we do not contemplate *esse* as a result of an abstractive process.

of the Supreme Goodness in the concrete. This connecting link is the Incarnation of the Word. "But that is a great mystery."

We are grateful to the author for an attractive presentation of a great problem.

HENRI RENARD, S. J.

The Creighton University,
Omaha, Nebraska

Expériences mystiques en terres non chrétiennes. **By Louis Gardet. Paris: Alsatia, 1953. Pp. 177, with index. 480 francs.**

The rather recent construction of the huge Bahaian Temple near Chicago represents a growth of orientalism in America notable since the end of the last world war. Before the war, the practice of orientalism was more or less restricted to the wealthy; now it is rapidly spreading to the middle class. It is easy to claim that the practiced interest in the oriental cults (including yoga) was imported from England, where it thrived, even more than in France, during the last half of the nineteenth century and the first decades of the twentieth. However, any importation involved was somewhat restricted to British-American societies. It does not explain the general appeal of these cults to many persons reared in the western tradition. To understand this general appeal, one must investigate the oriental cults, as well as that actual condition of western civilization which disposes many persons to adopt these cults.

The author of this short treatise is well equipped to undertake this investigation. Well trained in Catholic theology, he is also well versed at least in the Indian and Arabian languages and is thereby enabled to read the sources of the Indian and Arabian religions in the original documents. As he notes in the foreword to this treatise, "the following pages are only an initial essay on comparative mysticism. Their only aim is to serve as a prelude to more intensive works, especially a more exhaustive study on self-experience. The present work is in the line of research which is principally inductive" (p. 7).

As regards the oriental cults, Gardet traces their philosophical origin to a fact observed by St. Thomas Aquinas: "The science of the soul [psychology] can serve as a principle for knowing separated substances" (*Summa Theol.* I, 88, 1, ad 1). All the oriental cults have this in common that they begin with self-examination, that is, with an

examination of the operations of the human soul; and the practices of these cults are all geared at arriving at least at a general knowledge of metaphysics. However, they are not guarantors of arrival at the knowledge of the true First Cause. Indeed, it seems that in most cases the oriental mystics have arrived only at an ontological identification of themselves with the First Cause of all reality. That is why the ordinary term of oriental mysticism is gnosticism. Gardet gives copious citations, especially from Mohammedan texts, which confirm this conclusion.

The special attractiveness of the oriental cults, then, is their esoteric character; by their usual termination in gnosticism, they have a particular appeal to the proud. And it is under this aspect that the oriental cults appeal to many persons educated in the western tradition: "A civilization centered upon material technique and exterior efficaciousness always risks leading men to an exteriorization of themselves into tasks of temporal power. Because of the vastness of human freedom, many men can possibly experience a nostalgia for another dimension, that is, the dimension of the spirit. But man's taste for efficaciousness may lead him to the experience of an absolute which a spiritual technique can, to a certain extent, guarantee for him; and his desire for power can turn him first to attempts at self-realization" (p. 2). In other words, modern man's pride, abetted by the ease of modern material techniques, can lead him to self-deception in his desire to use a comparable technique for the advancement of his spiritual life.

However, the oriental cults do not necessarily terminate in gnosticism. As techniques they lead to a knowledge of individual man's act of existence. And thus, according to Gardet, God infusing His grace can lead the oriental mystic to Himself. The author judges this to be the case of three Mohammedans, namely, Ibn Hata', Hallâj, and Râbinha (pp. 52, 101-114, 131-148), although he insists that these persons were genuine mystics not because of the Mohammedan technique, but because of the supernatural graces which make baptized persons genuine mystics. The common trait of the true mystics cited is their approach to God through love, not through a merely negating asceticism.

By comparison, the Indian techniques are even more dangerous than those of the Mohammedans (p. 172). Modern religious indifference can be traced to India, "more exactly to modern India," where it is held that each of the various proposed religions is "a way, but mysticism is their common culmination; that each religious teaching is only an approach, a manner of proposing extremely abstract truth on the level

of human understanding, and that the mystic, the wise man, reunites into one unified wisdom the whole diversity of formulations of faith" (*Ibid.*). Lest the continuity of his treatise should be broken, Gardet does not go on to indicate the influence of modern Indian thought upon Tolstoy, upon the schismatic sects (especially the official Russian Orthodox Church), and consequently upon those who have been working among the Russian emigrés in Paris, where it had been introduced by the French orientalists of the latter half of the nineteenth century (as, for example, Leconte de Lisle and José-Maria de Heredia). We mention this historical aspect here because of its importance in relation to understanding the foundations of errors mentioned in the Encyclical Letter, "Humani Generis," as well as its effect upon the present status of existentialist philosophy.

We congratulate Gardet for the excellent synthesis he offers in this treatise, and we eagerly look forward to the promised "more intensive works." The only notable defect in the present work seems to be an oversight rather than an error. The author seems to claim that the supernatural virtue of hope is in the intellect when he says: "The virtue of hope should continue on earth to light up the way and guide charity" (p. 113). Moreover, Gardet could have simplified his explanation of the Indian concept of *âtman* (*brahman*) (p. 42) by indicating that the Indians confuse a logical genus with reality, that they place the logical universal above God because of this confusion.

Because of the importance of this treatise in relation to the growth of orientalism here in America, we heartily recommend this work to all the clergy, to all educators in high schools and colleges, and especially to those who are called upon to explain the fallacies of the movement to those Christians who are unable to defend the faith against this error.

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Truth. Vol. II: St. Thomas' _Quaestiones Disputatae de Veritate_, Qq. 10-20. Translated by James V. McGlynn, S. J., Chicago: Regnery, 1953. Pp. xi + 463, with glossary. $7.00.

This second volume of *Truth* completes two-thirds of the translation of St. Thomas' *De veritate* in the "Library of Living Catholic Thought" edition. There is no need to repeat here the general reflections on the

sources of the translation, its format, its utility, etc., as all these observations have appeared in the pages of this journal apropos of the first volume of *Truth*. (THE NEW SCHOLASTICISM, XXVII [1953] 361-369). One comment (or perhaps more accurately, warning) regarding the translation itself may not be out of place. The translator, James V. McGlynn, S. J., sets down two norms for his own work when he tells us that he tried "to avoid the anglicized Latin which is an easy substitute for a genuine translation" and "intended this to be a literal translation." These principles have provided us with a very readable text and yet, despite them, the author's sentences have at times an unavoidable twist of ambiguity for the simple reason that their English does not carry the technical connotations of the scholastic Latin. Suffice a single example from Question X, article 4, *corp.*: "All cognition follows some form which is the principle of cognition in the knower." To the average English reader, the first part of this sentence might mean "all cognition flows along according to some set pattern." And why? Because of the use of words, such as *form*, and the connotation of words, such as *follow*. Variant translations might be suggested but each has its own difficulty. The example is cited, in fact, less as a criticism of the present work and more as a commentary on the enormity of the translator's task and a caution to the unwary reader.

"This second volume of *Truth*," we are told, "is a translation of Questions 10-20 of St. Thomas' *De veritate*. Like the first volume, this section of the Angelic Doctor's masterly discussion of truth is a unit in itself. In these eleven questions St. Thomas investigates truth in so far as it exists in man; . . ." Question X, on the mind, plunges us abruptly into a psychology of human cognition. The questions on prophecy, faith, conscience, the knowledge of our separated souls, the knowledge of Christ which follow suggest by their very titles the breadth and depth of the treatment. Capital points, unfortunately, are occasionally hidden behind strange titles and in some cases these are topics well calculated to serve others than the professional philosopher or theologian. Question XII exemplifies this. In the fourth article the question proposed reads: "Is teaching an activity of the contemplative or active life?" We would hardly expect to find much that is "practical" under such a heading and yet teachers, educators, readers whose American interests alert them to literature such as Dr. Bestor's recent indictment of our public schools, all these will find some clarifying principles right here. For, when read in conjunction with the other

three articles of this question, it becomes quite evident that, first, the goal of education in general, such as is spoken of by Pope Pius XI in his encyclical, is not the same as the immediate goal and objective of teaching. Secondly, a perusal of these articles should make it clear that a theory of teaching necessarily flows from a theory of cognition and, consequently and in the third place, that teaching *as such* is not a process of will training, teaching people how to be good. It is confusion on this last point which is still beclouding the educational thinking of some Catholic groups today.

In conclusion, our thanks to the translator, who through a difficult medium has made a fund of thought-provoking material accessible to English readers generally.

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***The McAuley Lectures*, 1953: Truth and the Philosophy of Teaching: I: The Eminence of Teaching. By Etienne Gilson; II: Teaching and the Freedom to Learn. By Anton C. Pegis. West Hartford Conn.: St. Joseph College, 1954. Pp. 28. $1.00.**

The Sisters of Mercy deserve congratulations on this auspicious beginning of the series in honor of their foundress. With the clarity and profundity we expect of him M. Gilson in the first lecture analyzes the art of teaching; with the penetrating Catholicity we expect of him this very great teacher shows that the true eminence of all true teaching is related to that of the Divine Teacher Himself. In the second lecture Professor Pegis does a very refreshing and unusual thing: he discusses the problems of freedom, authority, and the relationship of student and teacher, *and* puts these on solid metaphysical grounds. Every teacher and certainly every Catholic teacher will want to read and reread this stimulating and encouraging booklet.

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Augustine to Galileo: A History of Science, A.D. 400-1650. **By A. C. Crombie. New York: British Book Centre, and Cambridge, Mass.: Harvard University Press, 1953. Pp. xv + 436, with index. $9.00; $8.00.**

Perhaps most students of the natural world are convinced that the long evolution of the earth and its inhabitants can be described as an essentially continuous, even if not quite uniform, process of development. Geologists are engaged in the task of interpreting the gradual formation of the earth's crust, and in proving the essential continuity of climatic and geologic changes. Biologists and paleontologists investigate the slow progress of variation and mutation in organisms of the past and present. In like manner the historians of science also are fruitfully occupied in discovering and explaining the various systems of thought about the natural world which have been developed in former times, and perhaps have not entirely ceased to be.

The results of recent historical research show clearly that modern science did not originate by spontaneous generation in the mind of a Galileo or a Newton, a Planck or an Einstein. Western science has grown gradually and by moderate steps from the methods and achievements of the Greeks and later of the Arabians. This precious treasure of ancient learning was inherited and carefully studied by the scholastics of the middle ages. By them it was refined, expanded and passed on to the early moderns.

The story of both Greek and modern science has been told often and well. But the achievements of the medieval period have not been widely known or appreciated because there has been no adequate short history of science in the middle ages. To fill this need for a brief but sufficient account of western science from the dark ages to the beginning of modern times the present book was written.

In the data here assembled we see the essential continuity of scientific thought and methods from the Greeks and Romans through the scholars of the middle ages to the naturalists and mathematicians of the seventeenth century, and consequently to our own day. The ancients endeavored chiefly to understand the world in all its multiplicity, variety and orderly change by discovering the proper physical causes of things. On the basis of sound principles and widening experience they attempted to distinguish and explain the intricate details of natural things and processes. They tried also to use mathematical reasoning, particu-

larly in astronomy, optics and music, but their technical and practical interests were not very extensive.

During the dark ages the heritage of classical learning was preserved for better times, but important technical advances were then made for improvement in the conditions of life. In the twelfth and thirteenth centuries Greek and Arabian science, including logic, mathematics and natural science as well as ethics and metaphysics, became known in the west and stimulated a great revival of scientific thought and investigation. During these and the following centuries original thinkers such as St. Albert the Great and Roger Bacon raised new questions which could be solved only by experiment and by the application of mathematics to measurable phenomena. Then scholastic and religious disputes became so acute that they divided men's minds and distracted their attention from the truly basic principles and proper methods of natural science as such. Thus the way was prepared for the rapid expansion of mathematical physics, and for the almost total eclipse of demonstrative physical science, which had traditionally been distinguished sharply from mere dialectical contributions.

In his introduction the author points out that the chief problems for the historian of science are concerned with the questions about the natural world which men were asking at the different periods, what answers they were giving to them, and the reasons why these answers ceased to satisfy later thinkers. This was not always due to the discovery of new facts, but sometimes to a new point of view, and to the asking of new questions which required new and different answers. In spite of the shift in interest from the qualitative to the quantitative, from the demonstrative to the dialectical, from the substantial natures to the measurable phenomena, we are presented with an essentially continuous development of scientific thought.

Yet we must not interpret this thesis in the sense that the more science changes the more it is the same. Without giving the Aristotelian system benefit of the distinction between its truly basic principles and its dialectical constructions, we are told that a way was opened for criticism which would "undermine his system" (p. 43); "lead later to the overthrow of his whole system" (p. 212); "undermine the foundation of his whole system of physics" (p. 213); "brought about the destruction of the whole Aristotelian system of cosmology" (p. 278).

Perhaps the author is here speaking as an historian rather than as a critic. But even so it is regrettable that he did not speak more ac-

curately of the Aristotelian doctrine. Surely the hypothesis of the eternity of the world is not opposed to the Christian doctrine of creation (p. 39). What we know from revelation is that God did not create an eternal world, not that He could not. Aristotle was a defender of genuine chance and indetermination in regard to many events, and so one may question the references to his "absolute determinism" (p. 41), or "strict determinism" (p. 236). We wonder whether St. Thomas should not be excluded from those who regarded gravity as an external force (p. 242). Of graver importance is the absence of any distinction between the general account of motion given by Aristotle in his *Physics* (employing both demonstrative and dialectical reasons) and the postulates of a special theory of mechanics such as Newton's, who explicitly stated that he had no intention of giving a general or basic account of motion.

One wonders also who it was who first decreed "the kind of question that should be asked in natural science, the kind of question, in fact, to which the experimental and mathematical methods could give an answer." (p. 212) How is this to be reconciled with the final sentence, "No construction of the mind can be used to set limits to the mind's activity, and the illumination that natural science has given in the modern world has depended precisely upon the practical recognition of this fact." (p. 403)

Again this may be the word of the historian rather than the critic. But when we read that the scientific method is exclusively mathematical, and that science has nothing to say about the existence of God (p. 402, 403), we realize that the word 'science' is being used in a very restricted sense which excludes the demonstrative natural science inaugurated by Aristotle and splendidly explained and defended by St. Thomas.

Nevertheless, this is an important, timely and well written book which, without being critical, fulfills its purpose of showing the continuity of scientific thought through the middle ages to modern times.

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***The Analogy of Names* and *The Concept of Being*. By Thomas de Vio, Cardinal Cajetan. Translated and annotated by Edward A. Bushinski, C.S.Sp., in collaboration with Henry J. Koren, C.S.Sp. Pittsburgh: Duquesne University Press, 1953. Pp. x + 93, with index. $1.50; cloth, $2.25.**

The translators of these two works of Cajetan rightly point out the importance and the value of the texts. There is no doubt that the treatises are classics. It is unfortunate but true that many graduate students and even some teachers find any Latin work difficult, and Cajetan's own involved style adds considerably to the difficulty. In general, the translation is literal, and as simple and clear as the involved nature of the original allows. The value of the text is considerably enhanced by the detailed index and the footnotes, which explain the text, give passages from other classical studies, and supply the passages from St. Thomas, Aristotle, and Averroes to which Cajetan merely refers. There is also a selected bibliography which should be a great boon to the beginning student.

Most Thomists consider Cajetan's treatise on analogy to be an entirely faithful supplement to the teachings of the Angelic Doctor. To be sure, a few voices have been raised in criticism, notably that of P. Descoqs, S. J. Thomists have remained unimpressed. Works like that of Lyttkens have not been noticed. Yet enough evidence has been brought forth to demand a serious re-examination of the great commentator's position within Thomism. A beginning has already been made with Etienne Gilson's study, "Cajétan et l'existence," (in *Tijdschrift voor Philosophie*, June, 1953) and Fr. Armand Maurer's article on the analogy of inequality (in this journal). Both of these detailed textual analyses prove that Cajetan's position differs from that of St. Thomas. This reviewer wishes to point out some other aspects of Cajetan's presentation of Thomistic metaphysics which deserve historical and textual investigation.

First of all, Cajetan is admitted to have "systematized" St. Thomas' doctrine. This may not be the philosophically innocent and objectively neutral work that most Thomists think it is. Take the identification of the analogy of proper proportionality with the analogy "according to 'to be' and according to intention" (as the present translation calls them.) St. Thomas gives as an example of the latter the analogy which is found between substance and accident. The substance-accident analogy is never, as far as this reviewer knows, called an "analogy of propor-

tionality" by St. Thomas; it *is* several times called an analogy of *proportion.* Is Cajetan's reduction merely making explicit what was implicit in St. Thomas? Or has the passion for schematic simplicity eliminated a kind of analogy at the cost of obscuring the relations of the realities known? The absence of a simple schema in St. Thomas' own texts does not imply that he was inconsistent with *himself*; it does raise a point about the relation between Thomas and Cajetan.

Another very doubtful contribution of Cajetan's is his assertion of the numerical unity of the concept of being (in *The Concept of Being*), and his importation of the notion of "objective concept" into Thomistic doctrine (*ibid.*). Such an understanding of being is entirely in harmony with the interpretation of the analogy of proportionality as arising from formal causality (*The Analogy of Names*, chap. 3, paragraph 27). This is also a reduction of being to form, and it is by no means evident that St. Thomas' metaphysics admits of such a reduction.

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The Philosophy of Jacques Maritain. **By Charles A. Fecher. Westminster, Maryland: The Newman Press, 1953. Pp. vii + 361, with index. $5.00.**

Charles Fecher has undertaken the difficult task of writing a book on the philosophy of Maritain for "the average intelligent reader." It cannot be said that he suceeds, though it must be said that his achievement is, in some respects, of real value.

The book is a labor of love, but the love could have proceeded from, and in turn could have been the occasion for, much deeper intellectual insights. That the book is written for "the average intelligent reader" is no excuse for these deficiencies One has to go deep, one has to submit humbly to the exigencies of the object (in this case, being, ultimately, and what Maritain has to say about being, immediately) when one sets out to expound the philosophy of a profound thinker for whom philosophizing is, rightly, a vital and progressive *deepening* of insight into being and its hidden secrets.

What is most disappointing is that the author does not really go to the heart of the whole matter, he does not really reveal the central and dominating intuition in the philosopher Maritain's every thought. He

does state, in Maritain's own terms, what this intuition is—the intuition of the primacy of *esse* (the act of existing) in being—but his grasping of this is not made the central and dominating intuition in his exposition of Maritain's philosophy. We would not maintain that Fecher should have pursued here all the intricacies of this intuition so far as it relates to Maritain's doctrine on analogy, subsistence, and the problem of moral evil. But we would suggest that his analysis would have been less mechanical and piecemeal if he had showed, for example, how this intuition accounts for the wide range of Maritain's studies; how it relates to his notion of progress in philosophy; how it explains his decidedly existential approach to social and political problems; and how it relates to such fundamental Maritain theses as the real distinction between essence and existence in any being other than God, the substantial union of body and soul in man, and the *veritas sequitur esse rerum* nature of all knowledge. The key to Maritain, and therefore to the writing of any book on Maritain's philosophy, is the insight that he is so distinctively and unreservedly, so simply and humbly mindful of *be*-ing, i. e., of the value and richness that is the act-of-existing in *any* being.

We would also suggest that the author should not have undertaken this study without his being able to read and translate French. It is true that most of Maritain's major works have been translated into English, but it is also true that some of these translations—and ones that Fecher relies on heavily—are very inaccurate. A paraphrase of such translations of the original text cannot but suffer from lack of precision, and consequent distortion. Then, too, it just happens that one of Maritain's most important books, *Neuf Leçons sur les Notions Premières de la Philosophie Morale*, has not yet been translated. In reviewing this book, Abbé Charles Journet could well say: "Un livre tout neuf, un livre d'une merveilleuse richesse, génial, où ce qu'il y a de profond dans l'ancien, rejoignant ce qu'il y a d'authentique dans le moderne et le contemporain, jette partout des éclairs." (*Nova et Vetera*, XXVII [1952] p. 74.) One cannot begin to do justice to Maritain's moral philosophy, nor can he sufficiently show its relation to Maritain's metaphysics, without a careful and meditative study of this book. Also, Fecher could very well have profited from an acquaintance with the Maritain issue of the *Revue Thomiste*, XLVIII (1948), entitled *Jacques Maritain: Son Oeuvre Philosophique*. The penetrating and scholarly studies in this volume—notably those of Aimé Forest, Abbé Journet,

Olivier Lacombe, and M.-V. Leroy—would have given Fecher valuable insights and leads for his more popular work.

But the book still has much value. First of all, the reader is given a good view of Maritain the person—a person of deep spirituality and abounding charity. And this is important in a book on a philosopher, as it would be in one on a poet or novelist, but for different reasons. For, though a man's love does not enter into his philosophy as such—the philosopher views everything *sub ratione veri, sine ratione boni et appetibilis*—nevertheless it does play an important role in the order of efficient and final causality, in the order of existential conditioning and motivation. Secondly, the quoted texts (some of them, again, poorly translated) have been well chosen and arranged with much understanding. And this is also important, for all too often an author expounding a man's philosophy either fails to let the philosopher himself speak, or lets him speak but once every fifty pages or so, and then only enough to tease, only so disconnectedly as to frustrate the reader. Lastly, we are given a commentary and a paraphrase that, though often untrue to the thought of Maritain, nevertheless have the real quality (and this only partly through their particular polemical character) of arousing intellectual curiosity. They will lead and introduce many a new reader to a study of Maritain's books.

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Existential Psychoanalysis. **By Jean-Paul Sartre. Translated and with an introduction by Hazel E. Barnes. New York: Philosophical Library, 1953. Pp. viii + 275, with index. $6.00.**

Sartre: His Philosophy and Psychoanalysis. **By Alfred Stern. New York: Liberal Arts Press, 1953. Pp. xxi + 223. $4.50.**

Both of these books relate to the same section of Sartre's main philosophic work, *L'être et le néant*, which represents probably the most interesting and provocative of the more recent contributions to the problematics of psychoanalysis. The translation of Hazel E. Barnes is to be followed by a separate publication in English of the entire Sartrian opus. The rendition copes successfully with the intricacies of Sartre's language and terminology and shows the translator's familiarity with both phenomenological and existentialist philosophies (some doubtful statements on Sartre's relationship to Heidegger notwithstanding).

The translation of the two chapters dealing with "Existential Psychoanalysis" and "Bad Faith" is preceded by a general introduction into the meaning of Sartre's "ontological phenomenology," in which it is pointed out to what extent Sartre follows in the tradition of "orthodox" psychoanalysis and where he differs from this tradition.

In the discussion of Sartre's concept of "nothingness," it is correctly observed that "Sartre has not entirely avoided falling into the trap of treating a mere thought process as if it were actually a thing" (p. 15). Miss Barnes is on equally safe ground when she states that one of the greatest weaknesses in existentialist philosophy is its failure to take sufficiently into consideration the influence of social factors on the development of the self (p. 21). In analyzing Sartre's thesis of man's "absolute freedom" and his contention that "man is fundamentally the desire to be God" and that man's failure to accept the responsibility of such absolute freedom is "bad faith," Miss Barnes pertinently asks how it is possible to lay down ethical imperatives while at the same time denying ethical absolutes (p. 27).

Miss Barnes describes the "existential psychoanalysis" of Sartre as resting on the ontological knowledge of the human condition as well as of the condition of inanimate things. Sartre rejects the theory of the "unconscious" and asserts that a human being is *conscious* of all his acts though he may not understand them on the level of rational reflection. Moreover, Sartre holds that every human project can ultimately be reduced to a fundamental "choice of being" and that in the light of this fundamental choice every human act and desire, every taste and preference is significant and merits analysis.

The great weakness of Miss Barnes' exposition of Sartre's thinking lies in her unfamiliarity with the Aristotelian-Thomistic tradition of philosophy and with the fundamentals of Christian theology. A knowledge of these traditions would have helped her to understand (though not condone) Sartre's seemingly paradoxical dual assertion that "man fundamentally is the desire to be God" and that "man is a useless (i. e., futile) passion." Such knowledge would also have prevented her from finding Sartre's argument for the "self-contradictory nature of God" (the *en-soi-pour-soi*) "applicable . . . only to the Scholastics' God or . . . to a transcendent deity," and from burning incense at the altars of an "immanent God" and the "limited deity of James and Mill" (p. 25).

The study of Sartre's philosophy and psychoanalysis by Alfred Stern

(who teaches languages and philosophy at the California Institute of Technology) is of considerably broader scope. It consists of two major parts, the first dealing with Sartre's existentialist philosophy, the second with Sartre's existentialist psychoanalysis. The introduction states that "Sartre's philosophical and literary work is not only a fashion of left-bank cafés and night clubs" but "animated by a deeply earnest, passionate search for philosophical truth" (p. xvii). The chapters that follow try to substantiate this claim but also point out certain fallacies in Sartre's thinking and in particular the French philosopher's dependence on such authors as Descartes, Pascal, Hegel, Bergson, Nietzsche, Heidegger, Freud, Alfred Adler, Bachelard, and others—an indebtedness which remains unacknowledged in almost every single case.

To characterize Sartre's philosophic views, Stern refers to Schopenhauer's saying that there are two types of thinkers: "those who became philosophers by observing the world and those who became philosophers by reading a book. Sartre, certainly, belongs to the latter group. He became a phenomenologist by reading Husserl, an existentialist by reading Heidegger, and an existentialist psychoanalyst by reading Gaston Bachelard—and also Freud and Adler" (pp. 165 ff).

Stern's penetrating analyses reveal a wide reading in philosophy, and related fields. The main weakness of the book is the many emotionally charged snap judgments, especially with respect to Heidegger, Husserl, Hedwig Conrad-Martius, and the phenomenologists generally. In Stern's opinion, they are just no good. This unphilosophical bias is especially conspicuous in the sporadic references to Heidegger, whose philosophic tenets are in all instances grossly misrepresented. The German thinker is mischievously pictured as a Nazi, an anti-Semite, an anti-humanist, a nihilist, and a barbarian, while the actual total nihilism of Sartre is gently glossed over. An anti-German *ressentiment* is noticeable throughout Stern's book and mars an otherwise scholarly presentation. That Stern himself adheres to a relativistic philosophy of the "as if" is evidenced in the statement that "if we want to perform great deeds in life, we must live under the *fiction of immortality*" (p. 139; italics are the reviewer's). The really unforgivable sin of the existentialists, including Sartre, is for Stern that they are, in his opinion, "metaphysical and moral absolutists."

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God and Polarity: A Synthesis of Philosophies. **By Wilmon Henry Sheldon. New Haven: Yale University Press, 1954. Pp. 712, with index. $8.00.**

In order to arrive at a fair estimation of Sheldon's ambitious undertaking, it must be considered in two ways: as a survey of the leading types of philosophy, and as a systematic synthesis of these philosophical positions. The two aspects of the book cannot be separated, since the survey has in view an ultimate synthesis and since the latter, in turn, finds its content in the actual doctrines of the philosophers.

Viewing the long history of philosophy in East and West, the author finds six main types of systems. There are two kinds of idealism, monistic and pluralistic; materialism has had several guises but always affirms a monism of the visible world; Thomism is the leading form of scholastic philosophy; the modern Western world has given rise to the philosophy of process; a challenge to all the above forms of rationalism is provided by the irrationalism of many Eastern mystics and the existentialists. The greater portion of the book is devoted to a circumstantial description and criticism of these major doctrines. What gives the book its great bulk and its appearance of being a repository for all the author's readings, is his method of explanation. It consists partly in paraphrase and partly in numerous short quotations from the original sources. The main line of argument would have profited by a more economical approach. Nevertheless, this is an imposing and moving journey through the country of philosophy.

It is Sheldon's synthetic aim, however, which provides the basic unity of theme. He is greatly concerned about the spectacle of constant conflict among philosophers, climaxing in today's divided world. He seeks both to explain the origin of these disagreements and to provide the principles for overcoming them through a total synthesis of philosophies. The wars of minds are traceable to the excessive reliance of Western thinkers upon reason and rational evidence alone. These abstract instruments are unable to convince people and hence they breed the desire to refute other doctrines. Western systems tend to make an exclusive claim of having all the truth, in marked contrast with the peaceable co-existence of the Eastern philosophies. The latter follow the way of intuitive experience and action, which alone can provide the foundation for harmony among different philosophies. Sheldon does not advocate the elimination of reason but only its synthesis with intuition and the norms of action.

This appeal to action is bound up with a metaphysical theory that

the reality of things consists in their active power. The criterion of reality and philosophical truth is found in the experience of power. Hence the agreement among minds arises from a conative factor of will and action, rather than from a purely contemplative beholding of objects. Sheldon seems to be indebted to Dewey's description and criticism of the so-called spectator theory of knowledge. But he does not inquire into other meanings for speculation and contemplation which take account of the operative character of being and the demands of active life. In saying that the will grasps something more and richer than does the intellect, Sheldon falls victim to the ambiguity in the verb "to grasp." It may mean simply "to be in some sort of contact with" reality or, more definitely, "to know" reality. When realists defend a speculative knowledge of being on the part of intellect working with sense, they do not exclude the presentation of reality through our practical contacts. Existential knowledge is not speculative through any blindness to, or divorce from, our practical relations with things, but only because of how the intellect regards the knowledge garnered from all its human sources. Our practical engagements with being do provide some of the content of existential knowledge, but this knowledge is not formally directed to practice as its end.

Sheldon's chief claim is that all the main types of philosophy stand in the polar relation of opposites, each one containing a partial truth and supplementing what its counterpart lacks. Thus idealism values mind and (in pluralistic systems) the integrity of the individual thinker, whereas materialism defends the reality of the natural world. Sheldon has the highest praise for Thomism, which both appropriates the sound features in idealism and materialism and adds its own stress on God and the analogical levels of being. The author accepts personal theism and the analogy of being, but he also makes room for the modern concern with process and ideal possible objects, as found in Leibniz and Whitehead. From the Eastern mystics and the existentialists he receives a new appreciation of freedom, individual decision and action.

Taken by themselves, many of the analyses in this massive work have permanent value. There is a vigorous refutation of the panpsychism advocated by many process-philosophers today. Searching evaluations are made of the theory of a finite God, the existentialist stress on the emotions, and the naturalistic shibboleth of public experience. In defending the validity of the Thomistic ways to God, Sheldon claims that they should be supplemented by the ontological proof in a new form.

He reserves for another book the complete statement of this proof, but the present outline of it seems to rest upon the twin rationalistic principles of sufficient reason and plenitude. How an ontological proof based on these principles can be reconciled with God's transcendence and freedom in creation (both of which Sheldon accepts) is not shown. Another point which remains obscure is the precise connection between Hume's theory of belief as a wholly practical affair and Sheldon's contention that our real knowledge of being is practical and not speculative. It appears that the latter is based upon the former.

A test case of the worth of polarity as a primary principle of demonstration and synthesis in philosophy is provided by Sheldon's treatment of Thomism. His polar approach compels him to regard essence and existence, substance and accidents, as metaphysical "pairs" or correlated things endowed with distinct centers of active power. He then suggests that essences by themselves constitute a Leibnizian realm of objective possibles, regulated solely by the principle of sufficient reason. As he understands it, Thomism involves an unqualifiedly dualistic theory of man, bases metaphysics on the three degrees of abstraction, demonstrates by means of the principle of the plenitude of being, and regards beatitude as the exclusive perfection of intellect. Although Sheldon warns that his approach is systematic and relatively invulnerable to historical objections, it cannot be absolutely invulnerable to them. For otherwise, his synthesis fails to deal in any genuine way with the actual philosophies of men. In the case of Thomism, the misinterpretations are not due solely to the employment of secondary sources but mainly to the need to regard principles of being as paired things or opposite counterpart agents. This doctrinal requirement indicates that polarity remains a handy metaphor for concrete classification, rather than a strict principle of universal synthesis of philosophies. We must still live with the fact of irreducible philosophical disagreements on the basic issues.

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Plato's Modern Enemies and the Theory of the Natural Law. **By John Wild. Chicago: The University of Chicago Press, 1953. Pp. xi + 259, with index. $5.50.**

In the last several decades a number of books have been published attacking Plato's moral philosophy on the basis that it contains all the

perversions that have afflicted certain areas of the contemporary political and social order. This is sound insofar as the authors of these books recognize the fundamentally moral orientation of Plato's thought as distinguished from the earlier stress on its epistemological character. After the monumental work of Jaeger, this position can hardly be questioned. It is the position of the author also. What the author does question is the interpretation of Plato's moral philosophy as presented by these men. This is the point of departure of his book and the groundwork on which it is loosely constructed. It is necessary to mention this for in some sense the book is poorly titled. On reading the title one is inclined to expect a developed exposition of Platonic moral philosophy, while in actuality large sections of the book develop points neither explicitly nor implicitly concerned with Plato.

The first part of the book is an examination of numerous charges brought against Plato by some contemporary writers. Though they may disagree on some points the general thesis of their attack is that Plato is an enemy of freedom, the open society, and democracy. At these charges the author aims a devastating counterattack exhibiting a wealth of Platonic scholarship. Backed up by an unusual knowledge of the texts the author frees Plato from the charges brought against him. To this reviewer it is the best part of the book.

The remainder of the book (and it is the major part) is concerned with the theory of natural law—misconceptions of the theory, a brief history of it, and a discussion of natural law and contemporary ethical problems. The author's treatment of the misconceptions of the theory and the history of the tradition of natural law is good. It is when he poses his thesis that Plato was the founder of natural-law philosophy, and attempts to substantiate his thesis from the texts, that the argument lacks conviction. This reviewer is not criticizing the author's statement of the theory, which is clear and precise. What he is criticizing is the author's interpretation of Plato on this point. For example, the identification of the *good* with the fulfillment of innate tendencies and the identification of the *evil* with the frustration of these tendencies does not seem so much a position of Plato but rather a product of the teleological mind of Aristotle. The author holds this as one of the five doctrines characteristic of natural-law philosophy but this seems to be an Aristotelian interpretation of Plato rather than Plato himself.

Finally, in the last section of the book, the author discusses the importance of natural-law philosophy for contemporary ethical problems

and applies its principles in a discussion of some of these problems. Because the author is here appealing for a return to natural-law philosophy in order to combat the relativism prevalent in contemporary ethical discussion, he swings too far to the other extreme insofar as he does not give sufficient place to the role of social and historical factors in moral situations.

Though this reviewer disagrees with the principal thesis of the book, he nevertheless recommends it as interesting and controversial. It will be valuable in stimulating further research on this topic of vital importance.

JAMES WIELAND.

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Sancti Thomae de Aquino Super Librum de causis expositio. **By H. D. Saffrey, O.P. Textus philosophici Friburgensis, 4/5. Fribourg: Société Philosophique; Louvain: Editions E. Neuwelaerts. Pp. lxxiv + 150. 18 Frs. S.**

This is the first critical edition of St. Thomas' commentary on Pseudo-Aristotle's *Liber de causis,* the importance of which in the Middle Age can be estimated from the fact that between one hundred twenty and one hundred fifty manuscripts of it are extant. The work was composed in Arabian in the eighth or ninth century, probably in Spain, It is an elaboration of thirty-two propositions from the second half of Proclus' *Elementatio theologica* and has an important place among the writings, both Christian and Arabic, that sought to bring Neo-Platonism into the sphere of religious monotheism. The merit of having discovered the true character of the work belongs to St. Thomas, who is therefore ranked with the critical scholars of the Renaissance. In his *Commentary,* which exists in an independent and a University of Paris tradition, the latter in turn consisting of two families of *peciae*-manuscripts, St. Thomas compares the *Liber de causis* with Proclus' work, whence came its material, and with Pseudo-Dionysius, with whose doctrinal position its author is aligned. No less important is the fact that this *Commentary,* composed in the first half of 1272, is among the last of St. Thomas' works and thus presents his final views on many problems.

JOSEPH N. GARVIN, C. S. C.

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Book Brevities

In Octo Libros de Physicu Auditu sive Physicorum Aristotelis Commentaria. **Edited by P. Fr. Angeli-M. Pirotta, O.P. Naples: M. D'Auria Pontificius Editor, 1953. Pp. 658, with index. Paper, $6.50.**

This welcome new edition of St. Thomas' *Commentary on the Physics* employs the same standards for constructing the text as the earlier volumes of a similar nature published by Marietti. As in these other volumes also, the highly useful numbering of paragraphs has been employed. There are more than a hundred pages of alphabetical index of terms, a synopsis in outline form spaced throughout the book, footnotes to point the reader to St. Thomas' references, and other footnotes to deal with problems and conflicts in the texts. Fr. Pirotta has also written a three-page introduction on the content and method of the *Commentary* and the relation between Aristotelian *Physics* and modern science.

Though the reader may have certain misgivings about the introduction, it is pleasure to record the appearance of a manual edition of the *Commentary on the Physics* together with all the pedagogical apparatus that has made its sister volumes so useful.

Accent on Form. **By Lancelot Law Whyte. New York: Harper and Brothers, 1954. Pp. xi + 198. $2.75.**

This is the second volume in an unusual series called "World Perspectives" under the editorship of Ruth Nanda Anshen. In his study of form, Whyte intends to provide, in the words of his sub-title, "an anticipation of the science of tomorrow." After a hasty and rather questionable history of the notion of form, we are told that form can have a legitimate meaning as "structure" or "underlying structural pattern." Though there is much to be said in opposition to the basic thesis of this book, particularly in its notions of man, life, and matter, the author, in his usually challenging way, has provided a possible meeting ground for science and philosophy by emphasizing the notion of pattern. If form were admitted as the reason or cause or principle of pattern in the material world, Whyte would be speaking in the spirit of Aristotle. In his present thinking, however, he takes form for what the Aristotelian would call its result in matter.

Descartes' Philosophical Writings. **Selected and Translated by Norman Kemp Smith. New York: St. Martin's Press, 1952. Pp. vii + 317, with index. $5.00.**

New Studies in the Philosophy of Descartes. **By Norman Kemp Smith. New York: St. Martin's Press, 1952. Pp. xii + 369, with index. $5.00.**

In the first of these two volumes, Smith has provided a new and annotated translation of the *Regulae,* the *Discourse,* part of the *Dioptric,* the *Meditations,* some letters on the mind-body problem, the *Passions of the Soul,* and a passage from the *Search after Truth.* Together all of these translations represent the Cartesian notion of man.

In *New Studies* to which the volume of translations was originally intended as a sequel, is the revision, in the light of subsequent research, of a similar work published by the author a half century ago. In thirteen chapters, documented by original sources as well as by interpretations of Descartes, the book moves through the whole of Cartesian philosophy. The spirit of the work is comparative and critical.

Though published by the same publisher in the same year and from the same author, these books are not exactly companion volumes, but both of them will be useful for an understanding of Descartes and hence of the whole modern philosophical movement that stems from him.

Enciclopedia Cattolica. **General Editor, Mons. Pietro Paschini. Volume XII, with indices. Citta del Vaticano: Ente per l'Enciclopedia Cattolica e per il Libro Cattolico, 1948-1954. No price listed.**

Within six years the magnificent *Enciclopedia Cattolica* has been brought to completion. The final volume contains a set of forty-two indices which cover the principle topics treated in the articles. They add greatly to the usefulness of the work. We should like to call to the attention of the members of the American Catholic Philosophical Association the information gleaned from the index on Philosophy. It lists ten articles on philosophy in general and the various philosophic disciplines. There are also approximately three hundred and fifty articles on special philosophical questions and six hundred articles on philosophers.

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